4.0 MANAGEMENT PLAN

The Management Plan is divided into three parts: (1) general management issues; (2) specific public and commercial activities, and (3) long-term management plans, programs and strategies. The first two parts, which to some extent are overlapping, include an evaluation of the potential threats or impacts that each identified activity may have on historic properties and how such impacts can or should be avoided or mitigated, if necessary. The management actions presented in this plan integrate: (1) existing DLNR policies; (2) the recommended management actions presented in the 2000 SHPD Plan, and (3) newly developed measures, some of which came out of the consultation meetings with Native Hawaiian organizations and individuals that are summarized in **Section 6**.

The Kahu Kū Mauna Council will take the lead in making recommendations for policies regarding cultural practices. The Council will consult with representatives of the Mauna Kea Management Board (MKMB), Hawaiian Culture Committee, the Office of Hawaiian Affairs (OHA), the Hawaii Island Burial Council, and Hawaiian Civic Clubs prior to developing final policy recommendations.

In the absence of administrative rules the Management Plan is a working plan subject to revision. Consultation with SHPD and possibly other divisions of DLNR (e.g., the Division of Forestry and Wildlife regarding hunting activities) should be undertaken prior to finalizing the Management Plan. Once the roles and responsibilities are clarified, the CRMP can be revised to reference the appropriate agency, rules, or agreements in the discussion of particular management actions.

4.1 GENERAL MANAGEMENT ISSUES

There are a number of general management issues (Table 4-1), which can be viewed and addressed in different ways. There are, for example:

(1) Public access and related public activity issues;
(2) Off-road vehicle use
(3) Routine maintenance activities
(4) Enforcement of existing rules and policies

4.1.1 Public Access

Public access to the top of Mauna Kea has been an issue ever since UH was given the lease to the Mauna Kea Science Reserve in 1968. Access continues to be a controversial and divisive subject as the results of the public opinion survey conducted by students at the University of Hawai`i at Hilo in 2003 demonstrated (see **Section 3.2.2.3**). When asked about the need to monitor and/or manage access to the top of the

Table 4-1. General Management Issues.

Action	Purpose	Management Action
Adopt measures that address issues affecting all major user groups on Mauna Kea and historic properties in all management areas	Minimize and mitigate the effects of debris on historic properties and the landscape Prevent or deter the use of vehicles off of established roads Minimize the impact of unrestricted public access on historic properties along the summit road and the summit region Improve enforcement of laws, regulations, and restrictions that protect historic properties and deter violations	Prepare guidelines to remove debris and reduce its initial distribution. Continue to prohibit the use of vehicles off of established roads and strengthen measures to deter off-road use. Institute measures to minimize the potential effects of unrestricted public access on historic properties and the historic district through registering visitors, distributing information on the protection of historic properties, and monitoring public uses. Institute measures to increase the effectiveness of enforcing and deterring infractions by maintaining a sufficient staff presence and compiling all laws, regulations, and policies needing enforcement. Have sufficient staff with enforcement or management authority to patrol the three management areas. Train staff to document the intentional alteration of historic properties to federal standards. Monitor the condition of historic properties to identify patterns in the alteration of historic properties. Maintain and update the catalogue of historic properties and their current condition for comparative purposes. Integrate all regulations, restrictions, and polices in a single document to aid management staff.

mountain 65.6% of the 626 people interviewed favored an entrance booth and 72.9% supported the idea of requiring visitors to stop and be informed of safety issues and the need to protect archaeological and cultural sites (Okinaka 2004).

Existing Policy on Public Access and Historic Properties Protection Measures

Public access to all three of the UH management areas is currently unrestricted, with several exceptions that were noted in the 1995 Revised Management Plan, such as restricting access for snow clearance; for health and safety reasons during heavy visitor usage periods, and for night-time observatory use when access to the area above Hale Pohaku is restricted to one half hour before sunrise and one half hour after sunset. From the narrow perspective of preserving historic properties, the more access to the summit region is controlled and restricted, the less likely it is that historic properties will be damaged or destroyed. Preservation alone, however, is not the overriding or exclusive mandate of this CRMP which also considers Native Hawaiian access and public education as major objectives. When all three objectives are considered, options

that emphasize the monitoring of access instead of restricting it are preferred. Site protection measures are presented in Table 4-2.

Table 4-2. Site Protection Measures for the Current Policy of Uncontrolled Access.

- Consider developing a policy to register visitors at Hale Pōhaku for health and safety reasons and as a means of controlling public impacts on cultural resources
- Direct visitors to historic properties suitable for visitation if self-guided tours become part of the educational and interpretive program; or inform them of guided tours if tours are incorporated into an educational and interpretive program;
- Provide users with information on historic properties and restrictions that protect historic properties and the historic district;
- Have some level of staff or ranger presence in frequently visited areas as a deterrent;
- Monitor the condition and the effects of public use on historic properties so that controls or restrictions can be revised when necessary;
- Enforce state laws or regulations when needed;
- Maintain an adequate level of staff presence to deter violations and encourage adherence to restrictions; and

OMKM has already implemented some of the site protection measures listed in Table 4-2. Soon after OMKM became operational in 2000 a Ranger Program was developed. The rangers are currently the most effective deterrent in preventing the vandalism of historic properties, although again, they currently lack enforcement powers. In the absence of administrative rules, UH also does not currently have the legal authority to establish and enforce a visitor registration policy. However, visitors, and hikers in particular, are voluntarily asked to do so for health and safety reasons.

4.1.2 Off-Road Vehicle Use

The primary threats of off-road vehicle use to historic properties vary with the type of historic property. Historic properties and the historic district as a whole can be affected directly or indirectly by the use of vehicles off of established roads. Direct damage can be caused by vehicles running over or into historic properties. Most vulnerable to this kind of damage are relatively obscure flake scatters that are one of the byproducts of adze manufacture, and cinder cones which can be scarred by vehicle tracks. Shrines are less vulnerable to these direct impacts given their common location on stone outcrops or outcrop ridges which are often inaccessible to vehicles, or are avoided in cross-country travel. Vehicle tracks can also scar the landscape within the historic district including the cinders cones. While some scars may be obscured by natural forces through time, others could remain visible for long periods, particularly if repeated use occurs. More importantly, visible tracks tend to encourage others to follow the same route if only out of curiosity.

Off-road vehicles can also have an indirect effect on historic properties because they allow individuals to access a greater number of historic properties and more distant parts of the Science Reserve with greater ease. This increase in accessibility to otherwise relatively remote properties can, in theory, raise the probability that historic properties or parts of the historic district could be altered or damaged.

Existing Policies and Additional Management Actions

The 1995 Revised Management Plan prohibits the use of off-road vehicles by the general public and commercial operators. The types of off-road vehicles specified as being subject to this prohibition include motorcycles, dune buggies, all terrain vehicles (ATV's), snowmobiles, and 4-wheel drive passenger vehicles, vans, and trucks. Exceptions are allowed for emergency rescue and medical reasons.

Since the inception of the Ranger Program, the 1995 Revised Management Plan policy on off-road vehicle use is being more rigorously enforced. The vehicle tracks that appeared on some of the more accessible cinder cones in the past have been obliterated. Infractions are still occurring but they appear to be fewer in number. OMKM has taken a proactive approach to this issue in providing information to the public. A free brochure--*Visiting Mauna Kea Safely and Responsibly*—is available to visitors with the compliments of OMKM. The brochure contains a map showing trails, roads and parking areas.

While the problem of off-road vehicle damage seems to be under control, there is clearly a need, however, for more specific management actions to prevent or deter off-road vehicle use and to mitigate the adverse effects of tracks and damage to historic properties. For example, how infractions are reported and tracked is currently unclear. Another unknown is whether mitigative actions are being undertaken by OMKM staff, and if so, what procedures are being followed. Table 4-3 lists various measures to regulate off-road vehicle use, to deter and mitigate any adverse effects, and to track infractions.

4.1.3 Daily Operations and Routine Maintenance Activities

Many of the daily operations and routine maintenance activities in the UH management areas carried out by Mauna Kea Support Services (MKSS) and the individual observatories will not affect historic properties and need not be subject to historic preservation review . Generally, all classes of activities that do not entail ground disturbance of any kind can be exempted from historic preservation review and compliance, as would those occurring in highly altered areas. In order to reach a clear understanding of which activities should be subject to historic preservation review and compliance and which activities could be exempted, PCSI consulted with MKSS and each of the observatories regarding daily operations and routine maintenance activities.

Table 4-3. Management Actions for Off-Road Vehicles.

General Measures

- Prohibit the operation of all motorized and unmotorized land vehicles except on roads or trails specifically designated for this purpose.
- Control the use of "air conveyance"; (e.g., special requirement for scattering ashes by helicopters and planes, aerial photography, and filming).
- Issue special use permits to allow otherwise prohibited activities for purposes such as research, education, and management.
- Restrict vehicles to designated parking areas such as those that are formalized and paved or those that are unpaved but marked for this purpose. The latter could include previously disturbed turning areas or stretches of road shoulders that have been previously disturbed and could accommodate parking safely.
- Retain and enforce current prohibitions.
- Adopt language used in NAR administrative rules in rules or management controls.
- Establish measures to prevent or deter vehicles from leaving established roads and designated parking areas.
- Maintain current guardrails and boulder barriers.
- Avoid or minimize visual intrusions on landscape if new guardrails or barriers are installed.
- Designate parking areas by unobtrusive signs, temporary signs when needed, or on maps distributed to public users.
- Inform public and commercial users and UH staff of these restrictions.
- Devise mitigation measures to obscure off-road tracks created by unauthorized or authorized vehicles.

Deterrence and Mitigation Actions

- Install guardrails in potentially hazardous stretches of the summit road after a road safety study assesses where they are needed.
- Install signs sparingly and ones that have been designed to certain specifications so that they do not distract from the landscape.
- Use low markers, instead of tall or reflecting signs, to delineate unpaved parking areas or stretches along the road where parking is permitted.
- Restore areas that have been marred by vehicle tracks. Experiments may be needed to determine which methods will best obscure the scars in differing slopes and substrate types. Those areas in which this has been attempted should be reexamined to see how effective these efforts were.

Management Actions for Infractions

- Develop reporting and mitigation procedures in consultation with DLNR.
- Develop a policy that includes the conditions contained in the NAR administrative rule on off-road vehicles.
- Develop a plan to assess the potential effects of off-road vehicles on the lower areas of the Science Reserve than can be accessed from below, (i.e., Kanakaleonui and Puu La`au areas.

Ron Koehler, the manager of MKSS, was consulted in 2006 regarding a range of routine maintenance activities, such as water delivery, waste removal, transportation of observatory personnel, and routine road maintenance. The activity most likely to have an adverse effect on historic properties is road maintenance, but as noted in **Section 2.3.1** no historic properties were found in a survey of a 100 ft wide corridor on both sides of the road by the Bishop Museum in 1987, except for a previously identified stone walled enclosure of questionable antiquity at Site 16204 in the Science Reserve.

While most maintenance activities and routine operations related to the support of astronomical research on Mauna Kea are conducted or overseen by OMKM and/or MKSS, there was a recognition, following a chemical spill on the summit, that some of the routine maintenance activities carried out by observatory personnel could potentially have an adverse effect on historic properties in the Science Reserve and the summit in particular. To address this issue, PCSI consulted with all 13 existing observatories in 2006. The consultation process consisted of a letter and follow-up phone call to the directors or their appointed staff (Appendix E) requesting assistance in providing information to help determine which activities should be included in the list of activities requiring historic preservation review and compliance and which activities could be excluded. The letter requested clarification or any new or additional information pertaining to activities listed below, which were subject to a detailed environmental assessment in the final EIS for the proposed Outrigger project (NASA 2005:4-83 to 4-103):

1. maintenance activities or routine operations involving the use of chemicals and other hazardous wastes in terms of how often they are delivered, how they are handled, how and where they are disposed of, and plans to mitigate accidental spills.
2. maintenance of the exterior dome surfaces and associated out-buildings (e.g., sheds), if they exist, in terms of, for example, how often they are painted and what kinds of repairs are made. The installation of safety ladders, small weather vanes and various other small instruments, such as cameras and anemometers, on a dome would be classified as “excluded activities.”
3. maintenance activities that involve ground disturbance, such as the repair of underground utility lines, in terms of the equipment that is used, the extent of the area that is opened up, and how the excavations are filled.

The results of the consultation process indicated that the hazardous waste use and disposal information presented in the FEIS for the proposed Keck Outrigger project for each observatory was accurate and in no need of clarification (NASA 2005:Table 4-19).

4.1.3.1 Excluded Activities

Table 4-4 lists all the activities that can be exempted from historic preservation review, including proposed activities in disturbed areas. Previously disturbed areas were identified based on an examination of aerial photographs and ground inspections, The most disturbed areas are: (1) the Mid-Level Facility parcel; (2) the summit access

Table 4-4. Excluded Classes of Routine Maintenance Activities.

Activity Characteristics	Examples	Review and Compliance	Plan Provisions
Entails no ground disturbance Entails ground disturbances in highly altered areas with no historic properties Does not alter the visual appearance of the historic district	Daily operations: • Water delivery • Waste removal • Transporting observatory personnel • Use of observatories Periodic or routine maintenance: • Road maintenance • Grading • Snow plowing and removal • Replace road markers • Fix guard rails • Repair electrical transmission lines • Replace signs • Repairs and painting of Exterior Dome Surfaces	None	Generate and update lists of excluded activities (compiled in consultation with DLNR) Prepare and update map of previously altered areas (including degree of disturbance)

road corridor from Hale Pōhaku to the summit; (3) the old batch plant and construction storage area located adjacent to the Caltech Submillimeter Observatory; (3) the immediate areas around each of the observatories, and (4) the jeep roads on the north and northwest sides of the mountain (Figure 4-1). Photographs of different kinds of disturbances related to road maintenance appear in the final EIS for the proposed Outrigger project (NASA 2005: Figures 4-2 to 4-4).

4.1.3.2 Maintenance Activities Requiring Historic Preservation Review and Potential Compliance

During the consultation process summarized above, the director of the CFHT Observatory noted the severe erosion of the road that encircles the facility and need for repairs before the guardrails are totally undermined. This is an example of an activity that would require historic preservation review (Table 4-5) because of the potential

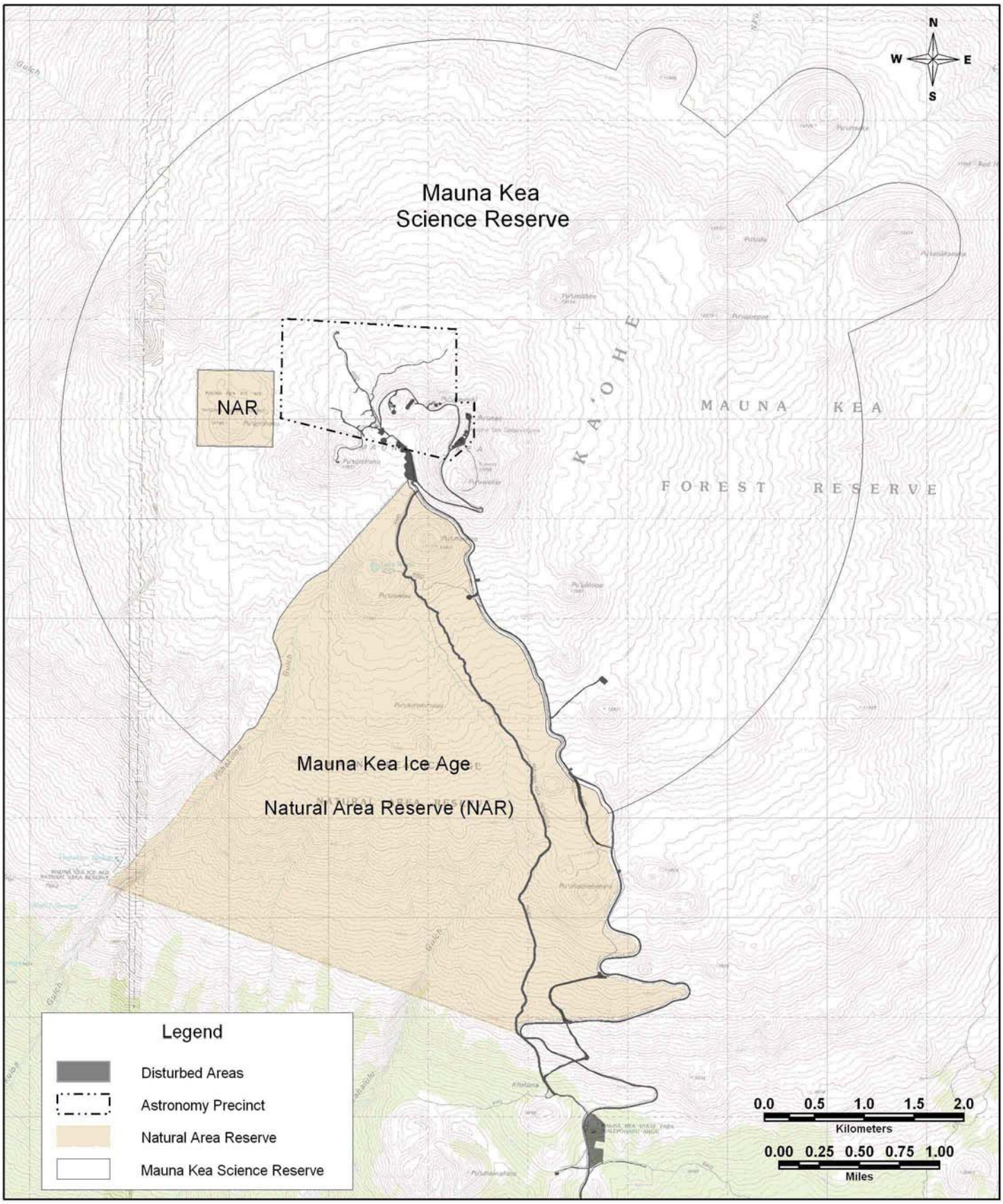

Figure 4-1. Disturbed Locales in the U.H. Management Areas

Table 4-5. Management of On-going Maintenance Activities Requiring Historic Preservation Review and Compliance.

Examples	Review and Compliance	Plan Provisions
Replacement of buried transmission lines. Improvement to drainage structures. Creation or extension of push piles from road grading. Removal of buried or partially buried structures. Installation or replacement of guardrails or barriers along road.	SHPD reviews proposed activity and asks for one or more of the following: • No survey, consultation, or monitoring needed. • Consultation with the Kahu Kū Mauna Council and other Native Hawaiian Community members should occur. • Monitoring of specified activities needed.	Generate and update lists of activities requiring review (compiled in consultation with DLNR). Prepare and update map of areas potentially affected by activities requiring review. Any excavations involved in the dismantling of observatories should be filled with natural cinder from an approved source. Seek SHPD compliance review. Develop a Programmatic Agreement for a prescribed list of activities.

to adversely affect the summit cones, which as previously noted are a TCP. The director also noted that proposed repairs to underground utility lines or the installation of new lines are currently referred to OMKM for review before a decision is made on appropriate compliance measures. This standard operating procedure should be amended to include consultation with SHPD. Other examples are listed in Table 4-5, together with review and compliance procedures and plan provisions for the long-term oversight of maintenance activities with potential adverse effects.

4.1.4 Debris

The widespread distribution of debris over the summit region has been recognized as a problem for a long time. The archaeological survey conducted in support of this CRMP has shown that some areas within the summit region are more vulnerable to debris accumulations than others and that debris is generated by a number of activities taking place on the mountain. Construction work, routine activities by observatory personnel, and activities by the public, particularly snow-related ones, all appear to contribute to the wide-spread and sometimes concentrated distribution of debris.

HAR §13-277-6 (3) requires that historic preservation plans address the manner in which litter or debris is controlled in the discussion of long term preservation measures. Debris and the removal of accumulated litter could potentially affect some of the historic properties in the Science Reserve in at least three ways:

1. Debris could physically damage or deface individual properties such as shrines or burials.
2. Debris can affect the visual integrity of the historic district and individual landscape features within the district. This potential effect is particularly high given the open and exposed landscape of the summit region.
3. Systematic efforts to remove debris could, if not done appropriately, affect historic properties. Most vulnerable would be the shrines and the slopes of the summit cones. Individuals participating in the clean-up could inadvertently damage or alter a shrine if they were unaware of its significance or if collection points for the temporary stock-piling and removal of debris are placed too close to shrines or shrine complexes.

Table 4-6 outlines the general procedures to manage debris. A more detailed plan to deal with all aspects of debris accumulation and removal is presented in **Section 4.3.4**.

Table 4-6. Guidelines for Debris Management.

Take steps to minimize debris escaping from observatories, during maintenance work, and from construction sites.
Inform public and commercial activities of the impact of debris.
Install and maintain unobtrusive trash receptacles where users congregate.
Monitor the distribution of debris.
Conduct systematic clean-ups to remove debris without disturbing historic properties by: • Informing clean-up participants of historic properties and restrictions. • Designating debris collection and pick points which avoid historic properties.

4.1.5 Enforcement

Enforcement is key to the success of any management plan. In terms of enforcing historic preservation laws and protecting historic properties, the importance of having a full-time staff presence in the summit region cannot be over stated. The presence of rangers on the mountain since 2000 has been without a doubt a powerful deterrent to the vandalism of historic properties.

Management Actions

Though acts of vandalism may be less frequent than in the past the Rangers should nevertheless be trained in standard procedures for documenting potential violations. In particular, they should receive training in recording damage to historic properties such as that given National Park rangers who need to document damage or vandalism to standards required when enforcing the Archaeological Resources Protection Act on federal lands.

The completion of the archaeological inventory survey of the entire 11,288-acre Science Reserve will facilitate enforcement efforts since there will be a catalog of sites and site location maps that can be used in the assessment of site damage or alteration. Implementation of the long-term monitoring program presented in **Section 4.3.1** will help to focus enforcement efforts by identifying patterns of disturbance and the areas most vulnerable to human disturbance. The list of applicable laws and regulations presented

in **Section 1.6** will also facilitate enforcement efforts. Adopting administrative rules specific to the Science Reserve, as recommended in the 1998 Legislative Auditor's report, could help simplify the overall enforcement effort in that all the required procedures, prohibitions, and penalties applicable to all resources and uses on the mountain would be available in one document.

4.1.6 Emergencies

A number of emergency actions, such as rescue operations, could directly and adversely affect historic properties or degrade the integrity of the historic district. Emergencies are defined here as those actions which would be difficult to predict, which require a rapid remedy or response, and which may involve health and safety issues. Examples include the collapse of a road embankment or cinder cone face, the need to create a detour road, or having to remove vehicles that have gone off the road. Another example is chemical or fuel spills which could require an extensive clean-up effort

Management Actions

Although emergencies are a general management issue, they require, however, a specific plan. With the completion of an archeological survey of the entire Science Reserve the earlier concern about emergency actions in unsurveyed areas is no longer an issue. A draft emergency plan is presented in **Section 4.3.6**.

4.2 MANAGEMENT OF PUBLIC AND COMMERCIAL ACTIVITIES

The overview of public and commercial activities and user groups in **Section 1.4** gave some idea of the range of OMKM's management responsibilities, which includes everything from cultural and religious practices to the review and approval of filming applications. When each of the activities is considered separately and in detail the magnitude of OMKM's management responsibilities for cultural resources alone takes on a whole different perspective. Some activities have existing policies and are relatively easy to regulate in terms of ensuring compliance with historic preservation rules and regulations, but there are others, such as cultural and religious practices, that are for the most part unregulated.

4.2.1 Cultural Practices

The Master Plan and the appended SHPD Plan recognized cultural practices as a particularly important and sensitive matter. The Master Plan foresaw the need for an advisory group to assist OMKM in addressing cultural issues. The Kahu Kū Mauna Council was established to serve this function.

Access and use rights is one of the most important issues, but there are other fundamental issues that need to be addressed, such as which of the many cultural practices occurring today are acceptable to not only the Kahu Kū Mauna Council, but to the Hawaiian community in general. The only cultural practices that are currently prohibited by law (see discussion of civil and administrative violations in §6E-11 in **Section 1.6.1**) are those that tamper with ancient sites, but this has not prevented the

alteration of shrines and building of new cultural features from happening as noted below. Other practices, some of which are not based on traditional Hawaiian beliefs, are taking place without any restrictions. The need to establish policies and protocols is becoming more evident as the number and types of cultural and religious practices grows. There is now a mixture of Native Hawaiian and non-Hawaiian cultural practices taking place on the mountain, on the summit (Kūkahau`ula) and at Lake Waiau, for example.

4.2.1.1 Practices, Beliefs, and Protocols

A number of different kinds of cultural practices are occurring on the mountain today. The cultural impact assessment (CIA) for the Master Plan EIS recognized two broad categories: (1) traditional and customary cultural practices and beliefs, and (2) contemporary cultural practices. Traditional and customary practices and beliefs were defined as those taking place in the summit region as a whole, as well as those occurring at specific locations within the Science Reserve boundaries. The following practices and beliefs were listed under this category (PHRI 1999:39):

1. Performance of prayer and ritual observances important for the reinforcement of an individual's Hawaiian spirituality;
2. Collection of water from Waiau for a variety of healing and other ritual uses;
3. Deposition of piko (umbilical cords) at Waiau and the summit peaks of Mauna Kea;
4. Use of the summit region as a repository for human burial remains, by means of interment, particularly on various *pu`u*, during earlier times, and more recently by means of releasing ashes from cremations;
5. Belief in the upper mountain region of Mauna Kea, from the Saddle area up to the summit, as a sacred landscape—as the personification of the spiritual and physical connection between one's ancestors, history, and the heavens; and
6. Association of unspecified traditional navigation practices and customs with [sic] the summit area.

Contemporary cultural practices were defined as those based on modern beliefs. These were described as including "prayer and ritual observances, construction of new altars and subsistence and recreational hunting" (Maly 1998; PHRI 1999:40).

The FEIS for the Outrigger telescopes project made a point of emphasizing that "In Native Hawaiian society, cultural and religious practices and observances are inseparably intertwined" (NASA 2005:3-18). The practice of carrying and concealing umbilical cords (*piko*) on the mountain was described in some detail:

> The practitioners, and many families in the community, continue to carry the umbilical cords (piko) of their newborn children to the summit for concealment. This is a deeply spiritual activity and the piko may be concealed anywhere on the summit. The location of the *piko* is known only to the families, who mark the site by the alignment of physical features, including the *pu`u* and other geographic characteristics, such as the stars (NASA 2005:3-19 to 3-20).

The FEIS also noted that families are building new shrines and visiting the adze quarry to conduct cultural and religious rituals. Beginning in 1998 there have been spiritual observances of the winter solstice on the mountain. The altar (*lele*) on the summit was constructed at the time of the first observance, in 1998 (NASA 2005:3-20 to 3-21).

Some Hawaiians and scholars will undoubtedly argue that the distinction between traditional and customary practices and associated beliefs does not exist and that practices based on modern beliefs represent nothing more than the natural process of an evolving culture. Some, but perhaps not all who hold to this view, would presumably say that all of the cultural practices occurring today are legitimate and should not be regulated in any way. There are several reasons, however, why policies for cultural practices, however they are perceived, should be developed. Not only are new shrines being built, but some of the ancient shrines are being altered. The alterations are a violation of §6E-11, and the conditions set forth in the 1995 Revised Management Plan, which has been incorporated into the recently approved CMP, and the Master Plan, which recognized that responsibility for the protection of historic properties in the UH management areas rests with SHPD. The archaeological survey of the Science Reserve found evidence of the removal of artifacts from shrines, changes in the placement of uprights and more extensive "renovations" (McCoy et al. 2005).

As previously noted, Mauna Kea is now widely regarded by some as not only a sacred place, but the most important of all of the sacred places on the island of Hawai`i. Though widely acknowledged as such, some of the cultural practices occurring today in this sacred place are from a non-native point of view polluting the cultural landscape with debris and foreign objects and diminishing the integrity of ancient shrines through changes to architectural elements and, in some cases, the removal of offerings. As the late Mary Douglas, a preeminent British social anthropologist who wrote extensively on the concepts of pollution and taboo noted, "For us sacred places and things are to be protected from defilement "(Douglas 1966:7). She notes that this is in sharp contrast to many non-Western societies where there seems to be no sharp distinction between sanctity and uncleanness. She writes that this could mean "that our idea of sanctity has become very specialized," in contrast to traditional cultures where the sacred may have been "a very general idea meaning little more than prohibition" (Douglas 1966:8).

From an outsider's point of view some of the cultural practices that are occurring on the mountain today are resulting in a situation analogous to what ecologists call a "sliding baseline." A "sliding baseline," according to the philosopher Kathleen Dean Moore, is one where the standards of what is considered an intact, healthy environment or ecosystem have slid down to meet the degraded landscape that people today know. The process takes place because "changes often happen slowly and losses are often hard to see," (Moore 2004:xi) and a new generation of people, unfamiliar with what existed before, are likely to believe that what they see is "the way things have always been and will always be" (Moore 2004:xi). The process she describes is one that is currently happening in the summit area, where hundreds of what are believed to be new cultural features, some with crystals and other foreign objects, have appeared on the landscape in the last decade or so. Many people, including younger practitioners, may believe that what they see was built by Native Hawaiians, has always been there and should remain.

Moore points out that there is another sliding baseline—an "ethical baseline." She notes that while "we think of ourselves as good people" we allow the destruction or alteration of ecosystems. What is lost in the process is the "richness and complexity, the wholeness of an intact ecosystem" (Moore 2004:xii). To put this in cultural terms and the Mauna Kea context specifically, along with the changes in the traditional cultural landscape in the appearance of crystals and other objects, there has been an accompanying decline in the standards of human behavior. Nowhere is this more apparent than at the summit altar (*lele*) which was erected as part of a winter solstice ceremony by the Royal Order of Kamehameha I in 1998. In the last decade the *lele* has been modified, torn down and rebuilt. In its present form it resembles the frame of a Native American tipi to which was attached an eagle feather. Native Americans were purportedly involved in its construction which has been allowed to stand. Amongst the latest offerings, observed in the summer of 2008, are rattlesnake skins. While some of the modifications to the original structure were undoubtedly well intentioned, the original purpose in erecting an altar on the summit has been lost. Another example is a site located near the *lele*, which was destroyed sometime between the 2005 and 2006 field seasons of the archaeological inventory survey by unknown persons who would also probably think of themselves as good, decent people. In the latter case the site, a stone mound of unknown function, was dismantled and used in the construction of a windbreak wall.

There has been and undoubtedly will continue to be resistance to the development of protocols of any kind, even in the case of damage to ancient sites or to a modern structure like the *lele* on the summit. The Master Plan, for example, in responding to community comments regarding damage to historic sites and desecration of human remains in the past, noted that none of the claims could be verified and that in fact "The veracity of this criticism is difficult to assess since cultural protocols often prohibit knowledgeable people from disclosing this information" (Group 70 International, Inc. 2000: XII-6). The unwillingness to disclose information about even such serious matters as the desecration of burials marks a major departure from traditional beliefs and values, where people performing such acts would have been held accountable.

The time has come to begin a conversation amongst Hawaiian groups on the ethics of what is occurring in the cultural practices and religious observances on Mauna Kea. If other ethnic and cultural groups, such as Native Americans, are going to be allowed to continue to conduct cultural and religious practices then they, too, should be brought into the conversation and given an opportunity to develop a cultural access and use policy. A policy statement would at the minimum define what are culturally appropriate practices and what are disrespectful behaviors that should either be discouraged or perhaps banned altogether.

Though a difficult issue that cannot be reduced to a simple choice between the "old" and the "new", one initial question that might be addressed is which cultural landscape is going to be preserved, protected and managed—the traditional landscape of shrines and burials associated with the families with direct ties to the mountain top, or the changing landscape comprised of old and new elements made by diverse cultural or ethnic groups with diverse beliefs and values. Discussion of this issue does not mean that new cultural practices should be automatically banned or prohibited. Each generation of cultural practitioners has a right to develop its own myths and traditions,

but there should be some degree of accountability at both the individual and community level. Remarks such as, “who am I to question the practices of other practitioners?,” which essentially translates into an unofficial policy of “anything goes,” ignores or disregards not only traditional prohibitions, but restrictions of any kind. According to Kamakau, in traditional times “it was not right to trespass on someone else’s altar” (Kamakau 1964:96). The “anything goes” point of view also begs the ethical question of what an individual practitioner or the modern Hawaiian community as a whole is willing to accept. For example, would the erection of Christian crosses on the *pu`u* of the summit area by Native Hawaiians be seen as a culturally acceptable practice?

The purpose in developing a general policy and protocols for specific activities is to assist OMKM in managing cultural resources and practices, and to avoid conflicts between Native Hawaiian practitioners and people who may be inadvertently altering newly built shrines or cremations, to give a couple of examples. The development of protocols as a management tool is not antithetical to how sacred places in general are conceived and used. As “places apart” sacred areas by definition have restrictions:

> To say that a specific place is a sacred place is not simply to describe a piece of land, or just locate it in a certain position in the landscape. What is known as a sacred site carries with it a whole range of rules and regulations regarding people’s behaviour in relation to it, and implies a set of beliefs to do with the non-empirical world, often in relation to the spirits of the ancestors, as well as more remote or powerful gods or spirits (Carmichael et al. 1994:3).

The cultural resources section of the Outrigger Project FEIS, which summarizes much of the ethnographic work undertaken by Kepa Maly on Mauna Kea between 1996 and 1999, states that

> The summit of Mauna Kea from about the 2,804 m (9,000 ft) level is considered *wao akua*, a sacred region, with *kapu*, or restrictions in [sic] what may be done on the land (NASA 2005:3-19).

The location of the Mauna Kea summit region in the *wao akua*—place of the gods—carries with it a similar connotation as the Maori term *wahi tapu* as a sacred place. But as Hubert (1994:10) points out, the modern translation of tapu as “sacred fails to capture its true essence, for the deep spiritual value of *wahi tapu* transcends mere sacredness” (Sole and Woods 1992:342). Hubert goes on to note that –“There are even greater complications, for even within Maori society there are said to be different definitions and classifications:”

> The hierarchy and complexity of wahi tapu classification is compounded by the people of each iwi, hapu or whanau (tribe, sub-tribe or extended family) having their own definition which is valid only to them. No iwi, hapu or whanau would be so presumptuous as to define wahi tapu for another group.

While Hawaiian culture was not organized in the same way as the Maori, it is reasonable to assume that there were variations in the way *tapu* was conceived in Hawai`i since no known culture is monolithic in terms of its traditions and beliefs.

Management Action

The use of a sacred place, such as Mauna Kea, without rules and regulations is inconceivable from a cross- cultural perspective where sacred places are universally hedged with restrictions. The Cultural Impact Assessment (CIA) study conducted for the Master Plan EIS (see **Section 1.5.4)** recommended that "Plans need to be formulated, in consultation with cultural practitioners and families having genealogical ties to Mauna Kea, for access to and use of traditional sites and resources" (PHRI 1999:41).

4.2.1.2 Access

One of the more contentious issues discussed during the preparation of the Master Plan and the public meetings that followed, was the rights of cultural practitioners, including access. The Master Plan (Group 70 International, Inc. 2000: XII-5) noted that:

> In early discussions there were suggestions that modern cultural practitioners be given designated areas to engage in cultural practices. This suggestion was rejected because it was felt that there was no reason to place such restrictions on cultural practitioners.
>
> The Master Plan does not restrict traditional cultural practices anywhere in the Science Reserve. The single exception is to activities that may impact known historic sites. The responsibility for protection of historic sites rests with the State Historic Preservation Office and they are statutorily required to protect these sites.

Existing Policies and Additional Management Actions

The State historic preservation law, Chapter 6E, Hawaii Revised Statutes, does not specifically address Native Hawaiian cultural practices or access issues. However, it protects historic properties from alteration or destruction. Destruction or alteration can only occur on State land when authorized by DLNR.

The 1995 Revised Management Plan identified cultural practices as a permitted use but stated that such activities must be otherwise consistent with the plan's provisions and must not involve physical impacts. The 1995 Plan also restricted practices to daylight hours unless permission is obtained from DLNR and UH.

The existing policies on cultural access, while useful, do not go far enough. They do not take into account, for example, specific cultural practices and in particular those that could have an adverse impact on historic properties. In an effort to develop a consistent set of policies for the whole summit region OMKM may want to consider developing and implementing a permitting process like that developed for the Mauna Kea Ice Age Natural Area Reserve.

Cultural practices and visitation are not restricted in the NAR unless they involve prohibited activities or the disturbance of historic properties. Practices that involve the gathering or extraction of resources, such as basalt for adze manufacture would require in addition to a Special Use Permit, a Conservation District Use Permit. For traditional

religious access and practices, a permit would be recommended if the activity cannot be conducted elsewhere; will be consistent with the protective and educational purposes of NARS; does not degrade the natural resources of the Reserves; and will not be used for commercial purposes.

4.2.1.3 Offerings on Shrines

There are a number of cultural practices that could potentially affect historic properties. One practice that has become a major management problem in many places in Hawai`i, including many State Parks, are those involving offerings placed on shrines. At a number of religious sites and culturally significant places in Hawai`i, accumulations of offerings have become obtrusive and distracting to the point that they can have an adverse effect on historic properties. Organic offerings become a problem as they deteriorate or are dispersed by winds, while inorganic offerings, such as stones or objects made of modern materials, remain at the site for considerable periods of time unless removed.

On Mauna Kea the prime example of this problem is the *lele* on the summit, which has gone through a series of transformations and evolved over time into what is essentially an international shrine with offerings from a number of different cultures and religions. Mauna Kea is in this regard no different from many other sacred places:

> Sacred places, in almost every case, demand offerings, and these are similar not only in terms of their functions—mainly appeasement, supplication, and thanksgiving—but also in the nature of the materials and objects that are used (Carmichael et al. 1994:1).

Management Actions

OMKM should adopt and implement the actions listed in Table 4-7.

Table 4-7. Management Actions Pertaining to Offerings on Shrines.

- Establish protocols
- A culturally trained staff person or a specially designated individual shall be responsible for the culturally appropriate removal of offerings.
- Establish culturally appropriate means of handling the removal of non-food offerings.
- Food offerings shall be removed immediately following the ceremony.

4.2.1.4 Access to Burial Sites

The archaeological inventory survey of the Science Reserve identified several confirmed burial sites and many other probable burials (see **Section 2.3.2**). How many of the burials are visited by family members is unknown, but it is a practice that must be considered in the management of the Science Reserve.

Management Actions

Table 4-8 outlines the management actions that OMKM should consider adopting for access to burial sites.

Table 4-8. Management Actions for Access to Burial Sites.

- Native Hawaiians shall not be restricted from visiting burial sites for cultural reasons.
- The rangers or other management staff shall be notified of visits for security and safety reasons.
- Any disturbance of a burial site shall be reported immediately to the rangers and SHPD.
- Public tours of burial sites shall be prohibited.

Maintaining security at burial sites visited by Native Hawaiians is an issue that should be discussed by the Kahu Kū Mauna Council and other parties before adopting an official policy or guidelines.

4.2.1.5 Visitation and Use of Ancient Shrines

The visitation and use of "ancient" shrines is a cultural practice about which little is known, however, except for a few sites where obvious alterations have taken place. "Ancient" shrines usually were constructed for worship by a specific family. It is difficult, with the passage of time, to understand the full intent or meaning of a shrine's form and construction. In some instances, components such as the upright stones (god-stones) may have been intentionally set aside, hidden, or toppled after the completion of rituals.

Some of the old shrines in the summit region have been altered in the recent past. The upright slabs on some structures have been defaced with modern writing and symbols and the uprights on at least two shrines have been repositioned. There is also evidence of the removal of stone artifacts left as offerings to the gods of adze manufacture on at least one shrine. All of these alterations were done without the permission of the landowner and in violation of Chapter 6E.

The disturbance of shrines is most likely to continue, especially in areas close to roads. The expectation that more shrines will be modified in the future resulted in the detailed recording of the number, position, size and arrangement of shrine uprights during the archaeological inventory survey of the Science Reserve. The resultant data will allow land managers and archaeologists in the future to analyze changes in any of the formal attributes. For example, existing plan view maps of the shrines will enable management specialists to verify, during routine monitoring, whether new components are being added to shrines.

The consultations conducted with Native Hawaiian organizations for this CRMP indicate that there are practitioners who believe they have a right to modify the shrines of the ancestors and other practitioners who believe that the old altars should be left alone (see **Section 6**). The contrasting points of view indicate the need for discussions within the Hawaiian community and the Kahu Kū Mauna Council to develop guidelines for shrine visitation and use.

Management Actions

Table 4-9 presents the policies and other management actions on shrine visitation and use that should be implemented by OMKM.

Table 4-9. Management Actions for Ancient Shrine Visitation and Use.

- Access shall not be denied or unduly restricted for any Native Hawaiian wanting to visit the shrines within the summit region. These persons should be informed of the same general precautions and prohibitions as are all public users. These would include warnings about the effects of altitude and cold, windy weather conditions as well as the prohibition of off-road vehicle use and the need to control debris.
- No restrictions shall be placed on any Hawaiian cultural observance that is deemed to be appropriate by Kahu Kū Mauna and other Native Hawaiian organizations as long as the practices do not violate Chapter 6E.
- Kahu Kū Mauna Council, in collaboration with other Native Hawaiian organizations, shall develop guidelines regarding the use of ancient shrines.
- A program to regularly monitor the condition of ancient shrines shall be established. If the effects of heavy usage become apparent and lead to the deterioration of shrines, measures should be considered to control the frequency and number of commercial or public visitors to particular areas.

The monitoring of shrines and all other historic properties in the Science Reserve is described in the Historic Property Monitoring Plan (**Section 4.3.1**).

4.2.1.6 Construction and Use of New Shrines

In addition to the modern use of ancient shrines, there are persons who are also constructing new shrines (*kūahu*) and building less formal mounds (*ahu*) of stacked or piled rocks. Though most of the *ahu*, at least those located near roads, were probably erected rather recently to commemorate or memorialize a person or family's visit to the summit region, it is also possible that some *ahu* were built based on a religious belief and might therefore be viewed as a new or different form of shrine, especially since one meaning of *ahu* is shrine or altar (Pukui and Elbert 1971:8). *Ahu* built as shrines and those built for non-religious purposes are difficult, if not impossible, to distinguish based on morphological characteristics alone. This poses a major management problem that will require further discussions amongst Native Hawaiian cultural practitioners and land managers to determine what are shrines and what are not. For the purpose of this CRMP, new shrines are defined as those that replicate the older shrines in the sense

that they have one or more upright stones. The management actions for what are inferred to be modern, non-religious rock piles or *ahu* are presented in **Section 4.2.1.8**.

Existing Policies and Additional Management Actions

The 1995 Revised Management Plan for Mauna Kea states that cultural activities are permitted if they do not involve physical impacts. Whether the construction of modest shrines constitutes a physical impact needs to be determined. The problem is that construction of small architectural features, such as single upright shrines and *ahu*, is a type of land use not specifically addressed in the Conservation District regulations. It is possible that a legal opinion may have to be rendered to resolve this issue.

Under the NARS regulations, any construction is a prohibited use and requires a Special Use permit. Whether the erection of modest shrines is to be construed as construction remains to be determined.

The management actions that be implemented by OMKM are presented in Table 4-10.

Table 4-10. Management Actions for Constructing New Shrines.

- Guidance shall be sought with regards to the construction of new Hawaiian cultural features and the long-term management of these features. The Kahu Kū Mauna Council, in consultation with other Native Hawaiian organizations, will develop protocols that will consider which kinds of features and locations are appropriate or inappropriate, and whether a review process should be instituted.
- New constructions not complying with the established protocols and Chapter 6E will be dismantled.
- Newly built shrines will be described and their locations recorded so that they can be protected by OMKM Rangers on patrol and checked as part of the ongoing monitoring program.

4.2.1.7 Scattering and Burial of Cremated Human Remains

The scattering of cremated human remains and the burial of urns in the summit area of Mauna Kea is an on-going cultural practice, that although a private affair and thus not well known or documented, should nevertheless be regulated to prevent disturbance of historic properties and to avoid the situation of OMKM rangers having to respond to reports of disinterred human remains in the future. Mauna Kea is, of course, not the only place in Hawai`i where the scattering and burial of ashes is taking place. Another well known location is Hawaii Volcanoes National Park.

Management Actions

A management policy on the scattering of cremated human remains, like that recently instituted at Hawai'i Volcanoes National Park, should be developed and implemented for the Science Reserve. The National Park requires a copy of the death

certificate before a Special Use Permit is granted. The Special Use Permit contains a number of conditions. The actions listed in Table 4-11 should be implemented by OMKM in an effort to control where and how human ashes are being scattered in the Science Reserve.

Table 4-11. Management Actions for Scattering of Human Ashes.

- A death certificate will be required to obtain a Special Use Permit to scatter ashes.
- Scattering must take place in such a manner and in such a location that the ashes will not be located and identified as human remains; interment is prohibited.
- No memorials, plaques, photos, or flowers will be left.
- The permittee recognizes and is aware of the sensitivity of this activity and agrees to perform it in a discreet and private manner.
- All local, state and county rules and regulations will be followed.

4.2.1.8 Piling and Stacking Rocks

Single rocks and mounds of piled or stacked rocks on boulders and outcrops dot the landscape in the summit area of Mauna Kea. The majority of the 336 "find spots" recorded in the archaeological survey of the Science Reserve as of 2007 are piled and stacked rocks. Such features, which are widespread in Hawai`i, represent a traditional cultural practice which undoubtedly has some time depth, but whose purpose and meaning have probably changed over time. At the same time, there is reason to believe that a large number of the single rock features and small concentrations of pile or stacked rocks on Mauna Kea are modern and that many were constructed by non-Hawaiian visitors in the last decade or so. The proliferation of such features is undoubtedly a result in part of what is popularly known as the "copy-cat effect." The appearance in recent years of large numbers of rock piles at Hawaii Volcanoes National Park led the Park's committee of cultural advisors to view the construction of such features as a misguided practice resulting in the desecration of Hawaiian culture and, thus, a "cultural sacrilege" (Honolulu Advertiser Nov. 4, 2005). The increase in the number of rock piles and the implications for land managers was discussed in a draft interim monitoring plan developed by PCSI in 2006 (see **Section 4.3.1**).

Existing Policies and Additional Management Actions

Condition 13 of the 1995 Revised Management Plan (see Section **1.5.5**) stipulated that "There shall be signs about the protection of historic sites as well as discouraging people from making *ahu*, subject to funding." Table 4-12 outlines the management actions that should be considered as a means of controlling the piling and stacking of rocks.

4.2.2 Astronomy

Astronomy, which encompasses both research and education, is a specialized activity that by itself does not have an impact on cultural resources. The construction of

observatories, and the maintenance activities and routine operations related to the support of astronomical research are another matter.

Table 4-12. Management Actions for Piling/Stacking Rocks.

- OMKM shall adopt a policy similar to the one developed at Hawaii Volcanoes National Park to remove modern rock piles that are deemed to reflect a misguided practice.
- Commercial tour operators shall warn their customers that piling/stacking rocks is disrespectful "because the piles don't belong there" and that such behavior is prohibited. At the same time there should be a campaign to educate the public about the importance of preserving the cultural landscape. This could be done with an informational flier and posted signs where rock piles are most common, such as the area near the VLBA.
- A culturally trained staff person shall be responsible for the culturally appropriate removal of rock piles that are made on Mauna Kea.

Construction of the observatories on the summit, which has taken place over a number of years, has clearly had a cumulative impact on Kūkahau`ula (see King 2003), which was not recognized as a culturally significant history property until 1999, however, when it was designated a TCP (Hibbard to McLaren 1999). As noted elsewhere, while no archaeological surveys were conducted prior to the construction of the summit road in the mid-1960s there is no indication that any archaeological sites on the summit were destroyed at that time, or any time thereafter in the construction of the 13 existing observatories (McCoy 1999a:31). This conclusion is a based in part on interviews conducted by Kepa Maly with people involved in the construction of the summit road. His informants did not recall any historic properties being found on the summit during the construction of the first jeep road (Maly 1999: Appendix A-123). The presence/absence of archaeological sites on the summit is of little or no consequence, however, since the significance of Kūkahau`ula is spiritual.

In his declaration in the contested case hearing (OHA vs. NASA and IfA), Tom King noted that although the existing observatories were built years ago "their effects continue today" (King 2003:12). This means that the Kūkahau`ula TCP continues to be adversely affected, not only by astronomy but by all public and commercial activities, including for example, snow play.

Management Actions

The operation of the observatories were addressed in **Section 4.1.3.1** where it was concluded on the basis of consultation with all 13 existing observatories, that daily and routine maintenance operations do not pose a threat to cultural resources. Chemical use and disposal should nevertheless be monitored, but this responsibility should fall to the State Department of Health. DOH inspectors should be required to submit copies of their reports to OMKM. The removal, retrofitting or construction of new observatories is covered under future land uses (**Section 4.2.7**).

4.2.3 Recreational Activities

The upper slopes of Mauna Kea have been used for a variety of recreational purposes for some time, beginning with the early explorations to the summit and later horseback trips to Lake Waiau in the mid to late 19th century. With the construction of the stone cabins at Hale Pōhaku by the Civilian Conservation Corp in the 1930s, access to the summit area was made easier. The completion of the Mauna Kea Access Road to the summit in 1964 increased the opportunities for recreational activities on the top of the mountain.

"Extreme sports" is a relative new kind of recreational activity that was not addressed in the 1995 Revised Management Plan, but was discussed in the Master Plan, where it was defined as "recreational activities that seek dangerous and unusual thrills," and in the SHPD Plan.

Management Action

Prior to the acceptance of the Master Plan DLNR reviewed and denied a request to conduct an extreme sports event on Mauna Kea because of the potential for significant harm to the environment and insensitivity to the cultural significance of the mountain. OMKM has determined that extreme sports shall be a prohibited activity because of the liability that such activities pose.

4.2.3.1 Stargazing, Amateur Astronomy, and Non-Commercial Tours of Telescopes

Stargazing and amateur astronomy have become one, if not the most popular, activities on Mauna Kea today. It is believed that much of the stargazing that is occurring today is being done by people who have signed up with one of the commercial tour operators, which are regulated through a permitting process. How many individual amateur astronomy groups and individuals come on their own is unknown.

Existing Policies and Additional Management Actions

The 1995 Management Plan permits individuals to use the grounds of the Visitor Information Station at Hale Pōhaku for independent star-gazing and, if permission is granted by UH, they may also use areas within the summit region for this purpose. UH and the individual observatories operating on the summit are permitted to conduct tours of the astronomical facilities and to hold star-gazing, groups sessions at Hale Pōhaku. They are also permitted to convene other educational meetings at Hale Pōhaku. It is highly unlikely that the "average" sightseer or stargazer is having any effect on historic properties since most take place in previously disturbed areas on the summit and at Hale Pōhaku.

The management actions presented in Table 4-13 should be implemented by OMKM.

Table 4-13. Management of Stargazing, Amateur Astronomy, and Non-Commercial Tours of Telescopes.

Example of Activities

Daytime public tours of the Subaru Observatory.

School field trips to Hale Pōhaku or observatories.

UH sponsored stargazing programs at Hale Pōhaku seven times a week.

Amateur astronomers independently observe from Hale Pōhaku grounds.

Potential Effects on Historic Properties and District

Low potential effects because activities are confined to previously altered areas.

Parking off of previously disturbed surfaces could alter landscape or historic properties near Hale Pōhaku when user numbers are high.

Debris escaping from users could have a visual effect on the historic district.

Increase usage of Mauna Kea by introducing public to the mountain.

Management Actions

- UH or other sponsored tours should be confined to previously disturbed ground surfaces. This includes not only the tour or star-gazing activities themselves.
- All parking for these activities should be accommodated on previously disturbed surfaces. This is particularly important when specific events (e.g., meteor showers, eclipses, etc.) can attract large numbers of participants.
- Activities taking place on the summit cones, which have been identified as a TCP, should be conducted in a manner that does not further alter the current condition and integrity of the summit cones.
- Participants should be warned to keep litter or pieces of clothing from being carried away by high winds.
- When conducting group tours and stargazing sessions, presentations should include a brief overview of visitor policies and allowed activities in the summit region for those who may return to visit the mountain independently. In many cases, these tours may be the first introduction many have to Mauna Kea and some may want to return.

4.2.3.2 Skiing and Snow Play

Snow-related activities occurring in the summit region range from the simplest form of merely experiencing snow to the more technical sports such as down-hill skiing. These activities can include snow-play, snow-boarding, sledding, and cross-country skiing. The frequency, intensity, and location of these activities will always depend on the depth of snow accumulations, how long the snow cover lasts, and how far down the mountain slope the cover extends. These conditions can draw large numbers of people for relatively short periods (i.e., one or two days, a weekend, etc.) or cause only moderate increases in the routine number of visitors to the summit region. Despite this variability, most of these activities probably take place in relatively predictable areas.

For down-hill skiing, the favored runs are on Pu`u Poliahu, Pu`u Hau Kea, and the summit cones where established roads also allow a degree of vehicle access at the beginning and end of the runs. For other types of snow-related activities, factors such as proximity to access roads, convenient parking areas, and appropriate slopes for snow-boarding and sledding will influence where these activities are most likely to occur.

Most of the snow-related activities have the potential to directly affect historic properties. Because the cluster of summit cones (i.e., Pu`u Kūkahau`ula) is considered a TCP (Figure 4-2) skiing on the summit slopes could adversely affect this significant historic property. For example, visibly scarring of the *pu`u* could occur if skiing-related actions take place on portions of the cinder cone which are not covered with a sufficient depth of snow to protect the cinder cone. If this is the case, skiers should be asked to confine their activities (i.e., walking, skiing) to slopes that are covered with a protective layer of snow. Long-term monitoring of the cinder cone slopes should be able to identify the magnitude of these or any other affects.

Management Actions

The management actions for skiing and other forms of snow play are presented in Table 4-14.

4.2.3.3 Hunting

Hunting of wild sheep and goats for both subsistence and recreational purposes has a long history on Mauna Kea (Maly and Maly 2005:270). While the ungulate populations have declined in the last few decades, hunting is an on-going activity, which now also includes a number of non-native game birds. The decline in the ungulate populations is a good thing from an historic preservation point of view because the animals, which commonly bed down in the sheltered confines of rockshelters utilized by Hawaiian adze makers, disturb the cultural deposits which results in a loss of important information.

Existing Policies and Additional Management Actions

The 1995 Revised Management Plan lists daytime hunting as a permitted use under the terms of the lease between UH and BLNR, “pursuant to the rules and regulations of the Board.” The lease stipulated that hunting “must be coordinated with the activities of UH.” Hunting is a regulated activity under HRS 13-5-2 which covers both game birds (Chapter 122) and game mammals (Chapter 123). A map of the DLNR hunting units indicates that the UH management areas are located in Hunting Unit A (Figure 4-3).

In several respects, the potential effects of hunting on individual historic properties are similar to those of hikers in that damage would probably be inadvertent because of the inability to recognize features as historic properties. Particular to hunting, however, is the possibility that historic properties could be damaged by

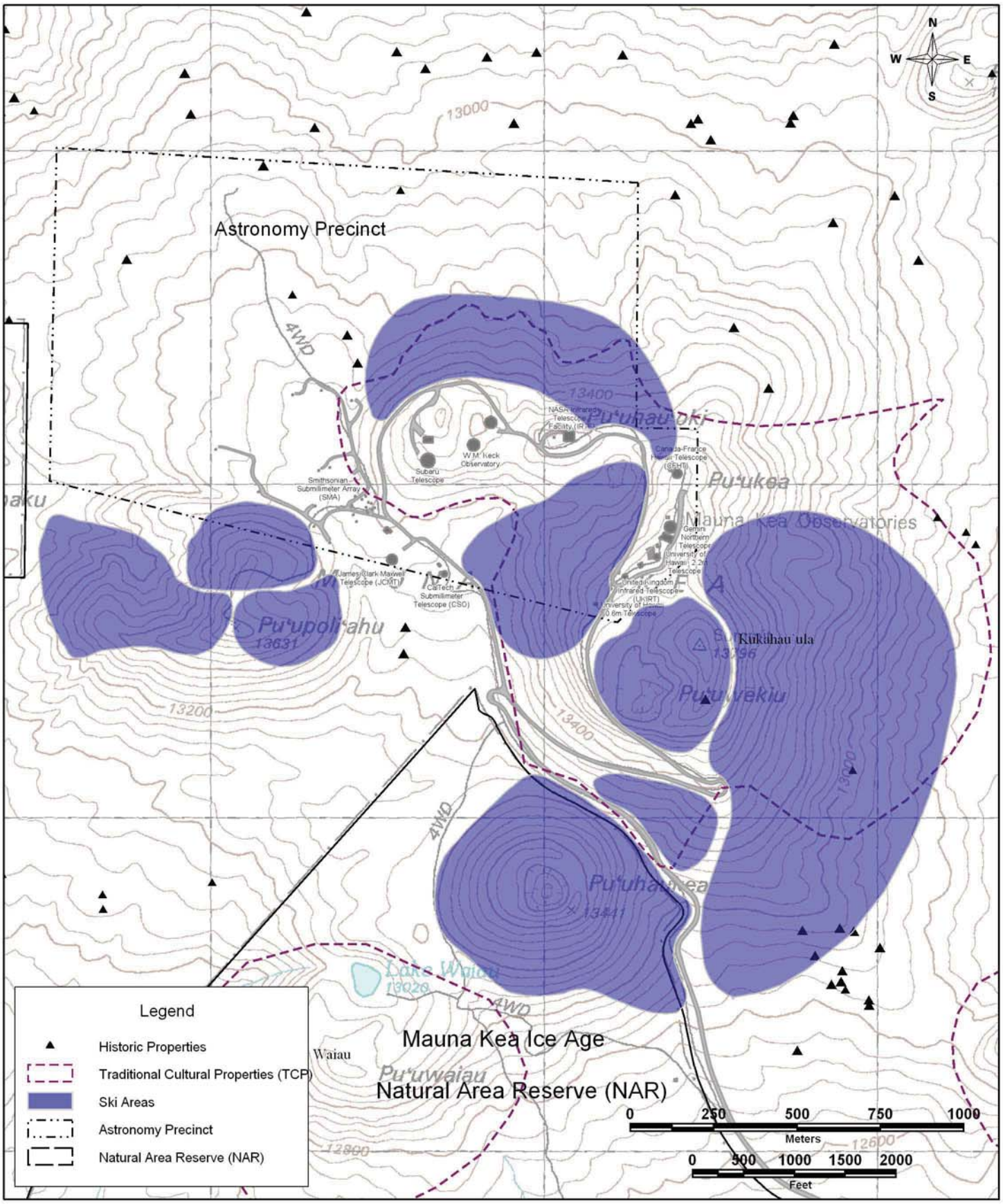

Figure 4-2. Commonly Used Ski Areas

Table 4-14. Management of Snow Play Activities.

Examples of Activities

Experiencing snow and winter conditions

Snow play

Snow-boarding and Sledding

Down-hill and Cross-country skiing

Potential Effects on Historic Properties and District

Scaring or eroding cinder cones during skiing, sledding or snow-boarding.

Inadvertent damage to shrines or flake scatters during cross-country skiing, snow-play, or snow-boarding.

Inadvertent damage to cinder cones, shrines, or flake scatters during emergency rescues.

Creating debris (clothing, beverage containers, Styrofoam board fragment, cardboard).

Need for rest room facilities.

Use of vehicles off-roads (caused by limited parking, wanting to reach snow banks or covered slopes).

Management Actions

- Confine down-hill skiing and sledding to cinder slopes with a protective layer of snow.
- Monitor long-term effects of snow-related activities on cinder cones.
- Designate areas where specific snow-related activities can occur.
- Inform users of designated areas through maps, temporary signs, or directions given by rangers.
- Inform users of rest room facilities and permanent trash receptacle locations.
- Increase ranger presence during high intensity use periods.
- Limit number of visitors or duration of visits during high intensity use periods.
- Install more temporary trash receptacles during high intensity use periods. Encourage removal of trash “what you take in you take out”.
- Perform debris clean-up sweeps in high use areas at end of winter season.
- Inform users of designated parking areas (also with temporary signs if needed).
- OMKM staff reviews emergency plans when winter season begins.
- Prohibit commercial tours and tournaments involving snow play.

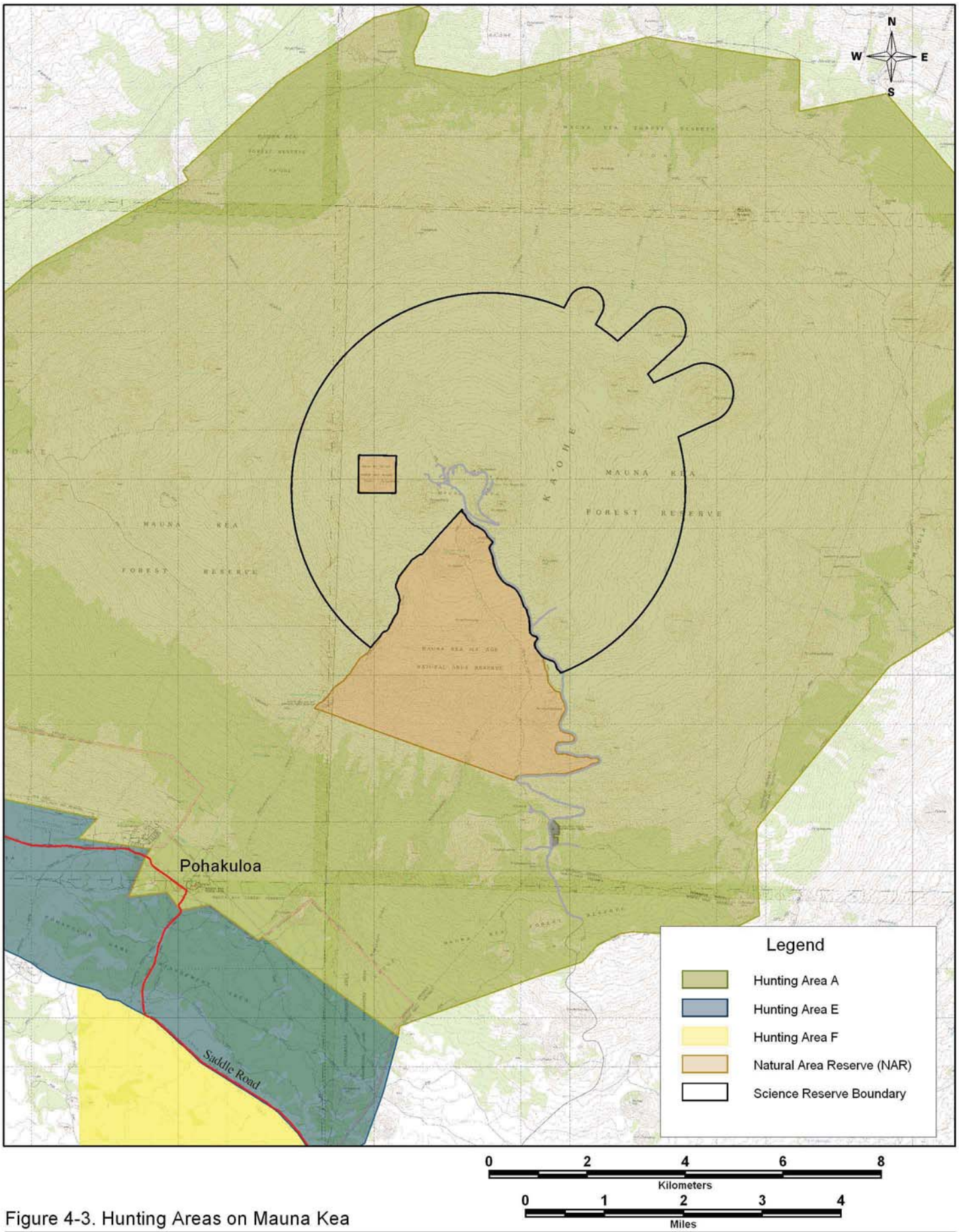

Figure 4-3. Hunting Areas on Mauna Kea

ammunition that misses its mark or is deflected. Hunters may also be tempted to use off-road vehicles to reach hunting areas that are at a distance from human activity and thus more likely to have unsuspecting game.

On current evidence the most heavily hunted areas are in the Pohakuloa and Waikahalulu Gulch drainage areas. These appear to be the areas most heavily utilized by the much smaller populations of wild sheep and goats, probably because of the existence of freshwater springs and proximity to Lake Waiau. The area with historic sites most likely susceptible to threats from hunting is the upper reaches of Pohakuloa Gulch area where the Science Reserve and NAR boundaries meet.

The potential effects of hunting can probably be reduced or prevented in two ways:

(1) Those granted permission to hunt in the Science Reserve should be provided an information sheet that describes the kinds of historic properties they might encounter in particular areas; warns against disturbing these properties; notes restrictions against driving off established roads, designates areas in which hunters can park; and asks that debris be controlled.

(2) If long-term monitoring indicates that hunters are adversely affecting historic properties in particular areas, then additional steps can be taken to prevent this damage. One solution may be to designate the areas immediately surrounding these historic properties as being off-limits to hunters. This is more likely to occur, if at all, in areas with higher concentrations of historic properties Table 4-15 presents other recommended management actions.

4.2.3.4 Non-Commercial Sightseeing, Hiking, and Educational Fieldtrips

As Mauna Kea has become increasingly popular with tourists, there seems to have been an increase in the number of hikers and sightseers. Most hikers appear to walk the Humu`ula Trail, beginning at Hale Pōhaku and ending at Lake Wai`au. This portion of the trail, which supposedly originated in earlier days near the Humu`ula Sheep Station, is located in the NAR and thus not one of OMKM's management responsibilities. Hiking is clearly taking place though in the Science Reserve. What effect, if any, it is having on historic properties is hard to judge, but some of the rock piles that dot the landscape in certain areas of the Science Reserve may be directional markers erected by hikers.

Existing Policy and Additional Management Actions

The 1995 Management Plan restricts recreational hiking to existing roads and trails, but the restriction does not seem to be well known to the public, nor does it seem to be enforced.

The most likely, direct effects sightseers or hikers could have on historic properties would be the alteration of shrines, the disturbance of burial sites, or the

Table 4-15. Management of Hunting Activities.

Examples of Activities
Rifle hunting for game birds, pigs, goats, and mouflon sheep.
Archery hunting for goats and mouflon sheep.
Potential Effects on Historic Properties and District
Inadvertent alteration of shrines, flake scatters, or burial sites.
Ammunition striking shrines.
Off-road vehicle use to access game.
Debris left in areas hunted.
Management Actions
• Enforce HRS 13-5-2 Chapter 122 on game bird hunting and 13-5-2 Chapter 123 on game mammal hunting.
• Prepare description and map of most likely hunting areas and assess potential effects on historic properties.
• Provide hunters with information on historic properties and the need to avoid them.
• Inform hunters of designated parking areas and prohibitions against off-road vehicle use.
• Inform hunters that they are required to remove all debris created while hunting.
• Monitor long-term effects of hunting on historic properties and the district.

scarring of cinder cone slopes. Those properties closest to access routes or visible from a distance are the most likely to be visited and are thus the most vulnerable. As damage to historic properties by visitors is primarily done inadvertently or in ignorance, providing visitors with adequate information on how to recognize historic properties and on their appropriate treatment should also reduce these effects. The indirect effects of sight-seers and hikers are essentially the same as people engaged in snow play activities in that they can generate debris, create a need for rest room facilities, could be tempted to drive vehicles off of existing roads, and could require emergency rescues. Although less intense than snow-related activities, effects caused by hikers and sightseers could be more widespread and less predictable as some hikers could reach infrequently visited areas farther from existing roads.

OMKM currently has no statutory authority or control over hiking, but the Rangers do attend to the health and safety of hikers and ask that hikers register at the Visitor Information Station (Office of the Auditor 2005:46). Table 4-16 lists the management actions that OMKM should implement, including the development of a permitting process similar to that used by NARS. Obtaining a permit allows conditions to be placed on group visits that are tailored to the particular areas being visited or the size of the group. This would be important for groups visiting for educational purposes because they are more likely to seek out historic properties. A similar policy has already be implemented for the NAR. The NARS 1997 management policies state that all

Table 4-16. Management of Non-Commercial Sightseeing, Hiking, and Educational Fieldtrips.

Examples of Activities

Non-Hawaii residents sightseeing in rented vehicles.

Sightseeing by Hawaii residents.

Day-hikers.

Excursions by school groups.

Individuals or groups interested in natural history.

Potential Effects on Historic Properties and District

Scarring or eroding cinder cones by walking or running down slopes.

Intentional vandalism of historic properties.

Defacing landscape features.

Management Actions

- Require groups greater than a specified size obtain a permit or special permission to visit off-road areas of the Science Reserve.
- Register all visitors to summit region so that information on historic properties can be distributed.
- Prepare appropriate brochures and a cultural orientation program, coupled with requirements that all entering the summit region must register. Registration provides the opportunity to distribute this information to all visitors and increases the likelihood of adherence to warnings and instructions.
- Inform visitors to avoid disturbing historic properties and of penalties in brochures or orientations.
- Inform visitors of need to control debris and personal belongings in high winds.
- Inform users of locations of trash receptacles, rest rooms, and parking areas.
- Create self-guided tours and regular guided tours to reduce the potential impacts by focusing visitation on particular properties which can accommodate visitors by having a guide present to monitor visitor actions.
- Individual hikers shall be discouraged because of the dangers of hiking at high elevations and for safety reasons.
- Creation of any new, formalized trails or substantial alteration of an existing route would be subject to review by the State Historic Preservation Division.

organized educational trips require a Special Use Permit which allows specific restrictions to be placed on the group's size and what areas will be visited. Currently, groups with more than 15 members are required to obtain a permit to visit the Mauna Kea Ice Age NAR.

4.2.4 Commercial Tours and Other Commercial Events

Mauna Kea has become a major tourist destination in recent years as reflected in a dramatic increase in the number of people who sign up for one of the package deals offered by commercial tour operators. There are currently nine permitted commercial tour operators on Mauna Kea. According to estimates made by the Department of Land and Natural Resources (DLNR) the number of paying visitors has increased from 24,164 in 1999 to 43,877 in 2005 (*Ho`opono Mauna Kea* 2007:4). In 2007 there were approximately 50,000 visitors (Stephanie Nagata, personal communication).

Existing Policies and Additional Management Actions

The permitting process for commercial tour operators has undergone several changes since it was first instituted by DLNR. Commercial tours are now one of the most regulated activities. Following the adoption of the Master Plan, UH requested a legal opinion from the Attorney General (AG) to take over the permitting process. In January 2005 the UH Board of Regents accepted the responsibility of regulating commercial activities and authorized OMKM to issue permits and collect fees (Table 4-17).

As summarized in the Spring 2007 issue of *Ho`opono Mauna Kea*,

> Starting January 1, 2007, OMKM assumed control of commercial operations and implemented new commercial permit terms and conditions, which included a significant increase in monthly fees, insurance coverage, security deposit, and penalties for non-compliance. Permitted operators would also be required to attend periodic meetings called for by OMKM.

The fees are deposited into a special fund that help defray the costs of maintaining the Visitor Information Station, the Mauna Kea Rangers program, and routine activities, such as road maintenance.

Even though the commercial tour companies are now required to comply with all applicable laws and are prohibited from touring the adze quarry, the potential still exists for damage or desecration of significant cultural resources because of the policy of unrestricted access within the Science Reserve. With the implementation of the new commercial tour permit process, the probability that cultural resources in the areas open to tourism (these are referred to as "Premises" in the Mauna Kea Commercial Tour Use Permit and include the Mauna Kea Science Reserve, Mauna Kea Access Road, and the Hale Pōhaku Mid-level facilities) will be adversely affected is minimized. Table 4-17 summarizes the management of permitted commercial activities.

Table 4-17. Management of Permitted Commercial Activities.

Examples of Activities

Commercial Operators:

Sightseeing tours to Hale Pōhaku and the summit with paid guide; Stargazing tour to Hale Pōhaku; Viewing special astronomical events at Hale Pōhaku

Potential Effects on Historic Properties and District

Scarring or eroding of cinder cones by walking, running, skiing, or snow-boarding down cinder slopes.

Altering of shrines, lithic scatters, or burial sites by hikers leaving established roads or trails.

Altering of shrines or lithic scatters by cross-country skiers or snow-boarders leaving frequented areas.

Damage to cinder cones, shrines or flake scatters during emergency rescues.

Visual impact of debris on the historic district.

Need for rest room facilities.

Landscape scared by vehicles when transporting skiers.

Management Actions

- Require all new commercial drivers and key personnel to attend a Cultural Orientation Class.
- Retain commercial permitting process which provides mechanism to:
  1. Inform operators, drivers, and clients of historic preservation restrictions and laws
  2. Enforce permit conditions, regulations or laws
  3. Revoke or suspend permits if operators or clients knowingly or unknowingly damage historic properties
  4. Restrict operators to areas and intended uses described in their applications
  5. Control the number and frequency of users
  6. Require vehicles to park in designated areas
  7. Prohibit use of vehicles off-road
  8. Require measures to reduce trash and remove all created by their activities
  9. Direct operators to provide temporary toilet facilities when needed
  10. Require emergency plans which avoid historic properties
- Control visits to historic properties by creating self-guided and guided tours to selected properties.
- Monitor and assess the effects of commercial activities and adjust controls or restrictions accordingly; no commercial tours for snow play; no commercial events such as ski contests/competition; no extreme sports.
- Ask operators to participate in service project clean-ups if appropriate and require all operators to remove all trash.
- Distribute information on the location of rest rooms and parking areas to all operators.

4.2.5 Film Industry Activities

Prior to the formation of OMKM the review and approval of applications to film in the UH management areas was handled by the UH Institute for Astronomy (IfA). The permitting process is handled by the Hawaii Film Office, which refers all requests to film on Mauna Kea to OMKM for review and approval. As explained on their web site, *Malama Mauna Kea*, OMKM has been processing on the average of 33 requests a year.

Existing Policies

A number of factors are taken into consideration in approving filming requests, which is done on a case by case basis. The primary consideration "is to see that Mauna Kea is portrayed with reverence, dignity, and respect." The historic preservation review and compliance component of the review process is based on OMKM's currently established procedures.

- Film activities require a permit from Film Branch (DBEDT), except for news coverage and filming astronomical activities.
- Require permit for all commercial film activities which include conditions to avoid or protect historic properties and the district.
- SHPD reviews all permit applications on a case-by-case basis unless all activities are restricted to previously disturbed areas.
- Include standard permit conditions addressing debris, parking, off-road vehicle use, and emergency precautions.

4.2.6 Research

Beginning with some of the earliest expeditions in the early 19th century that collected geological specimens and made observations on the natural history of the mountain, various research activities have been carried out in the summit region of Mauna Kea. Research on the natural and cultural history of the mountain continues, some of it related to the collection of baseline data for management plans, such as this CRMP and the Natural Resources Management Plan NRMP (Sustainable Resources Group Intn'l, Inc. 2009) that are being prepared as sub plans for Mauna Kea CMP. Research has been a regulated activity since the mid-1980s, but little has been done in the way of developing permitting procedures, except for the NAR.

In many instances research activities are easy to overlook or ignore from a management perspective as many do not involve activities that would alter or damage historic properties. Research activities can include those conducted to collect data, to make systematic observations, or to evaluate the status of resources within the context of research or educational objectives. These activities can range from relatively low-impact efforts, such as those in which researchers hike to specific areas to record information, to more intrusive efforts such as setting up instruments to record data over time.

Existing Policies and Additional Management Actions

The Management Plan contained in the amended 1987 Mauna Kea Science Reserve Complex Development Plan discussed non-astronomy related scientific research. The policy guidelines established at that time specified that:

> Scientific activities carried out as field work, with little or no construction involved and only short-term occupancy, will be reviewed on an ad hoc basis by the UH, with final review and approval by the Board of Land and Natural Resources (BLNR). The main policy guideline here is that the activities should not interfere with the on-going scientific work, or otherwise lead to inconsistencies with the terms of the UH lease. Permission should be received from the BLNR by the sponsor of any such activity; UH would require that the activity be financially self-supporting, including contributions where appropriate, to the cost of maintaining common service facilities such as the Information Station and the access road (Group 70 1987:145).

The 1995 Revised Management Plan does not address research except for astronomy. The Master Plan, while recognizing the need for baseline studies in biology and archaeology in developing a long-term integrated resource management plan, is primarily focused on astronomy. In one part of the Master Plan research is discussed in the context of education (Group 70 International, Inc. 2000: VI-1-11), but apart from referring to a document outlining the many different kinds of research projects that could be undertaken on Mauna Kea other than astronomy (Juvik 1998) there is no discussion of the potential threat of non-astronomical research projects on cultural resources.

Research activities taking place in the Science Reserve or at Hale Pōhaku are currently regulated through the State Conservation District Use permitting process administered by DLNR (Table 4-18). Under the Conservation District Use regulations, data collection is a permitted use in these two areas because they are classified as Resource Subzones of the Conservation District. The level of permit required for data collection primarily depends on the degree of ground disturbing activities involved in the research (§13-5-22 and 24):

- If data collection does not involve any form of “land use,” a permit is not required. As the definition of “land use” in this context includes the alteration or removal of materials or natural resources (§13-5-2), any research that involves collecting materials or resources would require a permit.

Research involving incidental ground disturbance, such as that required to install equipment, requires a departmental permit while data collection that causes more than incidental ground disturbance requires DLNR Board approval.

Despite existing regulations, some researchers are not aware of them or that their projects could be subject to regulation. Even the best-intended researcher, particularly those in the natural or physical sciences which can involve collecting, could inadvertently disturb historic properties out of ignorance. Additional management actions are presented in Table 4-18. Raising awareness of the requirements for conducting research in the UH management areas would help reduce the potential effects of these projects on historic properties because the permit application process

Table 4-18. Management Actions for Research Activities.

Examples of Activities

Record distribution of flora or fauna.

Collect rock samples or artifacts.

Geological mapping.

Subsurface archaeological excavations.

Install instruments to record climatic conditions.

Potential Effects on Historic Properties and District

Low probability of effects if research involves only observations.

Higher probability of effects if research involves collecting samples or installing instruments.

Inadvertent alteration of shrines, adze quarry features, or burial sites by researchers.

Alteration of the landscape by installing permanent equipment or instruments.

Visual intrusion by installed equipment or instruments on the historic district.

Management Actions

- Prepare guidelines for which kinds of research projects require permits.
- Provide researchers information on historic properties and warn them against the alteration of historic properties whether their research requires a permit or not.
- Provide researchers with information given visitors on debris, prohibitions on off- road vehicle use, and emergency procedures.
- Prepare guidelines for appropriate and enforceable research permit conditions.
- Research conducted within the management areas requires a Special Use permit approved by the OMKM and issued by the DLNR Board.
- The uses permitted must also be consistent with Conservation District Use regulations.
- The program will allow Special Use permits to be issued for otherwise prohibited uses if these activities are conducted for the purposes of research (§13-209-4 and 5). Examples of prohibited uses may include the removal or disturbance of historical or prehistoric remains.
- SHPD must be given the opportunity to review and comment on any research involving the disturbance of historic properties, including TCP's or the removal of any archaeological materials.
- For research projects requiring permits, SHPD should continue to review applications on a case-by-case basis and projects should not begin until written concurrence has been obtained from SHPD (Chapter 6E).
- Permit conditions for projects proposing to install equipment temporarily should require removal of all equipment within a specified time period after the project's completion.
- If equipment is to be installed on a more permanent basis or over longer periods of time, then the visual impact of any equipment on the historic district should be considered and mitigated when possible. Activities needed to maintain such equipment over time should also be addressed.
- Applicants should also be made aware that research funded with federal monies, such as the National Science Foundation, or conducted by federal agencies are also subject to the Section 106 review process (NHPA).

provides a mechanism to inform researchers of historic properties that could be affected by their actions. It also provides managers with recourse if permit conditions are not followed. The probability that projects could affect historic properties is relatively high given the number of known historic properties in the summit region. Those seeking information on conducting research should be encouraged to contact SHPD or the management staff of the OMKM to discuss what measures could be taken to avoid potential effects on historic properties or the historic district before they submit their applications. This would reduce the time needed for application review and approval.

Those research projects not requiring permits would probably be those that simply involve hiking to specific locations to make and record observations. Even if no permit is required, researchers should be encouraged to meet with appropriate staff prior to conducting their research so that they can be fully informed of the kinds of historic properties in the areas where they intend to work and the need to avoid disturbing these properties. Other precautions would be similar to those given recreational users or hikers wishing to independently visit the more remote areas. For example, the need to control and remove debris, to prohibit the use of off-road vehicles, and to consider emergency procedures should be emphasized. If a policy should be adopted that requires all public users to register before going up the summit road, the registration process can inquire if individuals will be conducting research. If they are and a permit is not needed for the intended activity, then they should be briefed at that time on the nature and distribution of historic properties in their areas of interest and of all the appropriate precautions.

Conditions can be placed on Special Use permits which are tailored to the proposed research. The application of these regulations to particular research activities should be clarified through guidelines prepared in consultation with the staffs of OMKM and the OCCL which administers Conservation District permits. The guidelines would help illustrate, through examples, which kinds of research activities are considered a "land use," which cause "incidental ground disturbance," and which constitute "ground disturbance" when these criteria are applied by OCCL staff. For the Science Reserve, examples should clarify which kinds of research activities would and would not require a Special Use permit given current interpretations of "prohibited activities." This would not only help expedite the application process, but would help rangers or management specialists identify which individuals should have obtained permits if they are noticed working off of established roads or when they register to enter the summit region. When administrative rules are adopted to manage the Science Reserve, provisions should be considered to require a level of scrutiny or disclosure that is not now always applied to research projects under the Conservation District administrative rule.

4.2.7 Future Land Uses

While there is no way of knowing what kinds of new land uses may be proposed and approved in the future, these might include projects such as the installation of restroom facilities, a ranger station or kiosk, and perhaps interpretive displays in a sheltered area on the summit. The one future land use that has already been brought to the attention of the public, in the Master Plan, is the recycling and/or construction of one or more new observatories. As summarized in **Section 1.5.6**, the Master Plan protects

all of the cinder cones (*pu`u)* in the summit area and prohibits development on any undeveloped *pu`u*. The discussion that follows is focused on the historic preservation review process for planned developments, such as observatories.

The approximately 525-acre Astronomy Precinct described in the Master Plan was established with a number of specific goals and objectives in mind, such as the recycling of older telescope facilities; clustering of new facilities in already developed areas, and construction of new observatories and infrastructure in or near disturbed areas to minimize the disturbance of previously unaltered areas (Table 4-19). The boundaries of the Astronomy Precinct were established to avoid or minimize adverse impacts on historic sites, only three of which were known to exist within the proposed boundaries in 2000. While the actual number of sites cannot be determined at this time because the boundaries of the Precinct have not been surveyed for metes and bounds, one additional site, found during the re-survey of the Precinct in 2005, (McCoy et al. 2005; McCoy and Nees in prep.) may be located within the Precinct on or near one of the proposed boundary lines.

The construction of three new facilities at new locations was described in the Master Plan. These will require the preparation of:

(1) An Environmental Impact Statement (EIS) under "Chapter 343-Environmental Impact Statements" (HRS) and "Title 11, Chapter 200-Environmental Impact Statement Rules" (HAR, Department of Health), and

(2) A cultural impact assessment (CIA) study to determine what effects the proposed project would have on Native Hawaiian cultural practices, features and beliefs.

4.2.7.1 Determination of Effect

The Master Plan indicated that the location of any new facility would be set back at least 200 feet from a cluster of shrines on the north slope of the mountain. While a 200 foot set back might be found acceptable, a buffer cannot be established until the Area of Potential Effect (APE) has been determined and approved by SHPD (Table 4-20). The APE, a term used in cultural resource management studies, is commonly defined as the geographic area or areas within which an action may affect historic properties, if any such properties are present or thought to exist. The APE does not equate to the "footprint" of a building or road, for example, and must therefore take into consideration a larger geographic area. The definition of the APE is not limited, moreover, to the consideration of physical effects alone, but should also take into consideration the potential for visual and auditory effects and indirect impacts, such as erosion, especially in the case of culturally and spiritually significant places like Mauna Kea (King 2000:46-48).

Evaluating the effects of a project on historic properties will differ for developments planned within the historic district (i.e., summit region) and those planned within the two areas outside the historic district (i.e., a portion of the road corridor and the mid-elevation facilities). Within the historic district, the effect of a project on the historic district as a whole needs to be assessed as well as the project's effect on individual historic properties located within or immediately adjacent to the project area. The effect of a project on the historic district must be addressed even if no individual historic properties are found within or immediately adjacent to the project area.

Table 4-19. Historic Preservation Compliance for Future Land Uses.

Examples of Projects	Potential Effects on Historic Properties and Districts	Review and Compliance Process	Plan Provisions
Constructing a new observatory or building Constructing additions to existing observatories or enlarging buildings Reconstructing or renovating an existing observatory or building which alters its outward appearance Creating or realigning roads Rest room or support facilities for public users Constructing or formalizing parking lots Rehabilitate cinder cone slopes Constructing or formalizing hiking trails Deconstruction of an existing facility or structure which entails altering undisturbed subsurfaces	Diminishment of the integrity of the cluster of cones forming the summit Visual impacts on the historic district Increased access to larger or more remote areas	Determine the need for a Conservation District Use permit If funded or sponsored by UH or a state agency: • Requires written concurrence of SHPD prior to commencement • SHPD determines procedural steps needed to comply with state laws and regulations • Compliance actions must conform with SHPD draft program and archaeology administrative rules and the Burial Sites Program administrative rule If federal funding or federal agency involved: • Requires compliance with Section 106, National Historic Preservation Act • Federal agency in consultation with SHPO and others determines procedural steps needed to comply with federal laws and regulations	Aid decision making process by: Consulting with Kahu Kū Mauna Council Reviewing Maps of Historic Property Locations in Proposed Development Areas Expedite compliance procedures by: Preparing guidelines for historic property treatment plans suited to the three management areas (Science Reserve, Hale Pohaku, Access Road Corridor): • Monitoring plans • Inadvertent burial treatment plan In consultation with Kahu Kū Mauna Council prepare guidelines for consulting with Native Hawaiian organizations and interested members of the Hawaiian community In consultation with Kahu Kū Mauna Council create a roster of Native Hawaiians wishing to be notified of all actions in particular areas

Adapted from 2000 SHPD Plan

Table 4-20. Historic Preservation Compliance Procedures for Future Land Uses.

Initial Review by SHPD	Historic Properties Identified during Survey in Project Area	Inadvertent Discovery of Historic Properties
Project description submitted to SHPD for review and comment (may be submitted concurrently with Conservation District Use application or Section 106 consultation) Initiate consultation with native Hawaiian organizations and interested individuals	Evaluate if project will have "no adverse effect" or an "adverse effect" on identified properties and the historic district If located at Hale Pohaku or in the road corridor, evaluate significance and integrity of individual property Determine treatment of adversely affected historic properties or district by: Committing to mitigation measures in preservation plans: • Interim preservation plan (protects properties during construction, sets buffer zones, may include monitoring) • Long-term preservation plan (protects properties during use of facilities, reduces visual impacts) • Burial treatment plan if burial present • Landscape rehabilitation	Historic property or burial found unexpectedly during construction or after inventory survey and acceptance of inventory survey report If burial is found: • Stop all work in immediate vicinity and secure area • Notify SHPD and police department to determine jurisdiction • Notify the Kahu Kū Mauna Council • If older than 50 years, SHPD determines disposition in consultation with Hawaii Island Burial Council • Prepare and implement burial treatment plan If historic property found: • Stop all work in immediate vicinity and secure area • Notify SHPD and the Kahu Kū Mauna Council • Document, evaluate, and determine treatment of property found • Consult with Kahu Kū Mauna Council

Adapted from 2000 SHPD Plan

Effects on the historic district would consider the visual impact of a facility on the surrounding landscape (i.e., the various land forms creating the setting and context of the multiple historic properties encompassed by the district) and on those individual historic properties which contribute to the significance of the district. Creating a network of roads would affect the historic district because, in addition to altering the landscape, it creates easier access to more areas in the historic district and thus increases the possibility of historic properties being damaged by visitors. For projects located outside the historic district, the effect of a project would be assessed on individual historic properties identified within or adjacent to a project area. Effects on individual properties can include the complete destruction of a property or severe alteration of the terrain in which the property is located.

4.2.7.2 Inadvertent Discoveries

If any historic properties should be found in the APE as defined above they will be classified as inadvertent discoveries now that an archaeological survey of the Science Reserve, including the Astronomy Precinct, has been completed. The process that should be followed if inadvertent discoveries are made during construction projects shall involve:

- Stopping all construction within the immediate vicinity of the property.
- Notifying SHPD, having the significance of the property assessed, and proposing appropriate mitigation measures.
- If the property can not be avoided due to construction or design constraints, it should be thoroughly documented before being destroyed.
- If it can be saved, appropriate measures are needed to protect the historic property during the remainder of the construction phase and when the facility is in use.
- Interested members of the Native Hawaiian community should be consulted for properties believed to be associated with Native Hawaiians (SHPD 2000:23).

Because some Native Hawaiians believe that human remains were uncovered during the construction of at least one observatory on the summit cones and burials are known to be present on other cinder cones in the summit region, any development or construction work requiring excavation near the rims of cinder cones should be subject to archeological testing prior to ground disturbance. Exceptions would be circumstances in which it can be demonstrated that previous grading or extensive excavations of the proposed construction site effectively precludes the possibility of any burials being present. When archaeological testing is required in a relatively small area, testing alone may be sufficient to establish, with a high degree of certainty, that burials are either present or absent before construction begins. If burials are discovered or if the area is relatively large and testing is not exhaustive, then any excavation undertaken during construction should be monitored by a qualified archaeologist. If the Hawaiian community wishes, provisions could be made for a cultural monitor. These provisions can be reassessed if no burials are uncovered after numerous test excavations or during monitoring, and it thus appears highly unlikely that any will be found in the future.

4.2.7.3 Mitigation

Once the effects of a proposed development project are determined, treatment of the identified properties is proposed. Treatments, generally called mitigation measures, can include thoroughly documenting an historic property before it is destroyed or preparing a preservation plan to assure a property's protection during construction activities (i.e., monitoring, ample buffer zones) and during the long-term use of the constructed facilities or infrastructure. In all three areas leased by UH, strong preference should be given to avoiding and preserving all individual historic properties whenever possible.

All mitigation measures would be set out in mitigation plans such as a data recovery plan (i.e., if the historic property needs to be documented and studied before being destroyed); an interim preservation plan (i.e., if the property is at risk of damage during construction); and a long-term preservation plan (i.e., measures insuring a property's protection long-term). To help expedite the preparation of these individual plans, guidelines should be developed on preparing these different types of plans based on the historic properties known to be present in these areas. In general, guidelines for preparing interim and long-term mitigation plans should be the most useful given the proposed Master Plan's commitment to avoiding all historic properties (SHPD 2000:21).

The mitigation and monitoring measures that were developed for the Keck Outrigger project and described in the Final EIS for the project are a good model to follow (NASA 2005: 5-1 to 5-7).

The protection of Kūkahau`ula, arguably the most culturally significant place on the mountain, became a major issue in the planning for the Keck Outrigger project. SHPD's review of the proposed project noted that the MOA for the project needed to describe appropriate measures to prevent further degradation of the summit. Examples cited in the SHPD letter included "…appropriate measures would include those proposed to stabilize the cinder cone slopes, control the accidental dispersal of debris during and after construction, determine the disposition of excavated material which cannot be reused on site, minimize the visibility of the outrigger observatories within the summit region as well as from a distance, and reduce noise during construction and operation of the observatories" (Hibbard to McLaren 1999). As the proposed outrigger project progressed, NASA began talking about "off-site" mitigation measures, which included such things as the development of educational programs. If plans are developed in the future to construct new facilities, retrofit existing facilities or dismantle and remove an observatory within the area defined as Kūkahau`ula, a part of which falls within the boundaries of the Astronomy Precinct (see Figure 2-4), special attention should be given to minimizing adverse impacts using the guidelines established by SHPD for the Keck Outrigger project.

4.3 LONG-TERM MANAGEMENT PROGRAMS AND PLANS

The third section of the Management Plan is focused on long-term management issues and strategies to address them. A number of specific programs and plans are presented, together with discussions on other long-term needs, such as continued

consultation with the Native Hawaiian community and data management. In addition to plans there is the basic issue of staffing needs to implement and enforce the policies and guidelines set forth in the CRMP.

4.3.1 Historic Property Monitoring Program

The 10,760 -acre Natural/Cultural/ Preservation Area that was established with the approval of the Master Plan (Group 70 International, Inc. 2000) will theoretically ensure the long-term preservation of all sites and the cultural landscape as a whole within that designated area. The preservation of historic sites located in the 525-acre Astronomy Precinct is more problematical, although it should be possible to preserve the few known sites in this area through avoidance and the establishment of protective buffers in the event of any future development.

4.3.1.1 Program Objectives and Background

The commitment to preservation, notwithstanding, the management of individual historic properties and preserves still requires long-term monitoring and, indeed, monitoring is a requirement for preservation plans under HAR §13-277-6 (8). For an area the size of the Science Reserve and the even larger historic district, there is clearly a need to develop and implement a monitoring program. The key component of the program will be a long-term monitoring plan. A monitoring plan should be prepared to determine strategies to systematically monitor the condition of identified historic properties located within the different management areas and the historic district. The primary purpose of monitoring is to determine what uses, if any, are affecting historic properties, the degree and frequency of these effects, and ways to prevent or minimize their occurrence.

Prior to the beginning of the archaeological inventory survey in 2005 there was no perceived need for interim site protection measures. This changed as the result of observations made during a 10-day survey of roughly 1,200 acres of the Science Reserve in September-October 2005 (McCoy et al. 2005). PCSI archaeologists observed that historic sites in some areas, primarily those located near roads, were being adversely impacted by a variety of activities, including the removal of artifacts, the rearrangement and in some cases “restoration” of sites, and the creation of new features on or near historic properties. The survey conducted in 2005 and the following summers also noted an increase in “find spots“. The increase in the number of these “features” appears to be directly related to the increased use of the summit region by visitors and Native Hawaiian practitioners, some of whom are either modifying existing sites or constructing new features to memorialize their visit to the top of the mountain or to perform ritual activities.

The degree to which the cultural landscape was being altered, and the likelihood that such changes would continue to occur, indicated that a monitoring plan was needed to evaluate site conditions on an immediate and on-going basis. In 2006 PCSI developed an Interim Archaeological Monitoring Plan (AMP) for selected areas of the Mauna Kea Science Reserve (TMK: (3) 4-4-015) and Lake Waiau in the Mauna Kea Ice-Age Natural Area Reserve based on the recommendation for such a plan in the report on the first phase archaeological inventory survey of the Science Reserve in 2005. The

primary purpose of the interim plan (McCoy et al. 2006) was to:

> develop and implement a set of standardized procedures for monitoring the condition of historic properties in selected areas of the Mauna Kea Science Reserve and the Mauna Kea Ice-Age Natural Area Reserve that have been adversely affected by human activity in the recent past and will likely continue to be affected in the future because of their easy accessibility.

For reasons noted below the Interim AMP was not implemented.

4.3.1.2 Management Areas and Responsibilities

Three forms of monitoring are recommended: (1) routine, (2) periodic and (3) rotational, based on a consideration of susceptibility to vandalism and cultural sensitivity or significance:

(1) Routine monitoring for the most accessible and, thus, threatened areas.

(2) Periodic monitoring for culturally sensitive sites and areas, including shrines, burials and cinder cones.

(3) Rotational monitoring of all historic properties every five years. This would include the least accessible areas where human disturbance is likely to be less common.

Monitoring of the historic district is a responsibility that will have to be shared by UH and DLNR since the proposed boundaries of the district extend outside of the Science Reserve and, thus, UH's management area. This is yet another management issue that will require meetings between UH and DLNR to develop policies and implementation procedures.

The early thinking about the monitoring of the cultural resources in the Science Reserve was to utilize the OMKM rangers, who regularly patrol the mountain between Hale Pōhaku and the summit, in addition to periodically inspecting the cultural remains at Lake Waiau. The Interim AMP included ranger training as a necessary plan component.

One day of ranger training was conducted in the field in 2006. Though only a trial effort, it was a valuable learning experience. It demonstrated that the task of monitoring the large number of archaeological sites and all of the other cultural resources (non-site areas such as cinder cones and the built features recorded as "find spots") in the Science Reserve was beyond the means of the rangers, regardless of how much training they might receive. It became apparent that the only effective way to monitor such a large and complex cultural landscape is to employ the services of qualified professional archaeologists. This became even more apparent as the archaeological survey progressed and more and more cultural resources were found. The need to contract professional archaeologists means that UH should include archaeological monitoring in OMKM's budget.

The rangers can still serve an important function in the monitoring process. Because of their full time presence they are the most effective deterrent to activities that harm and diminish the integrity of cultural resources. They can continue to monitor the most accessible and frequently visited areas, such as the summit. If a decision is made to use the rangers, they should receive training on how to relocate sites using GPS units and how to read and interpret archaeological site maps to determine whether any changes in a site have occurred since the site was first recorded or last visited.

4.3.1.3 Scope of the Monitoring Process

The Interim AMP was based on the idea that both sites and "find spots" needed to be monitored, on the assumption that the latter would remain intact and in some cases possibly undergo a major change in appearance. The plan also recognized the need to record new "find spots" for the purpose of continuing the process of documenting long-term changes in the cultural landscape. Given the large number of "find spots" found in the Science Reserve and the high probability that many of them are in fact modern, it is recommended that the monitoring process now focus on historic properties and the recording of new "find spots." Apart from the added time and expense, we now believe that little would be gained in monitoring all 336 known find spots.

The Interim AMP took the position that sites, whether they remain in passive preservation or are opened to the public in the future for educational and interpretive purposes, must be monitored, and that while the primary emphasis will be on the monitoring of the built environment (sites), the recognition of the whole landscape and region as culturally significant demands a broader perspective and approach. As already noted in **Section 4.2.1.1**, in terms of the archaeological monitoring process in general and the changing cultural landscape of the Science Reserve in particular, one important matter that needs to be considered by OMKM and the Kahu Kū Mauna Council is which of the many different activities that are taking place today are considered culturally acceptable and which are not and should be curtailed. Some activities, such as the construction of small piles of stacked rocks, could have unintended consequences for future land managers if the existing piles are left in place and the practice of building such features is allowed to continue. Such features could in time become part of the archaeological record, which would then require that they be assigned State site numbers, recorded in more detail and monitored, together with all of the other cultural features and sites in the Science Reserve.

4.3.1.4 Monitoring Frequency and Scheduling

While monitoring of the whole Science Reserve every five years seems reasonable, it will nevertheless require a considerable amount of time given: (1) the large number of historic properties dispersed over a large area in a high elevation environment subject to drastic changes in weather conditions at any time of the year, and (2) the likelihood that new "find spots" will be found in the course of monitoring each management area. Establishing a fixed, rigid schedule for monitoring each of the three management areas is probably unrealistic and to some degree impossible given seasonal changes in weather conditions in the summit area. Some flexibility is obviously called for in implementing the monitoring program. At the outset it is recommended that

the management area identified as needing routine monitoring be inspected once yearly and the periodic management area, every other year (Table 4-21). Some years the monitoring period might be limited to a period of perhaps four to five months because of inclement weather, while in other years it might be possible to conduct monitoring at any time warmer and drier conditions.

4.3.1.5 Monitoring Procedures and Documentation

The first step in the monitoring process, relocating previously identified sites, should be done with GPS units using the coordinates recorded during the 2005-2008 survey. Monitoring will also require the use of site descriptions, selected photographs and site maps. This is one of the reasons that sites, especially the more complex sites, need to be well mapped, described and photographed. It is also the reason for establishing photo reference points on site maps, so that whoever is doing the monitoring in the future has a series of fixed points to take a series of new photographs and compare to the old ones in the site files.

The Interim AMP included three forms that were designed for the purpose of recording the condition of sites and "find spots." The recommendation to exclude previously identified "find spots" from the monitoring process is reflected in changes to the original wording in the Interim AMP. The inspection process described in the Interim AMP using the forms that had been prepared at that time is still applicable, although some changes to the forms may be needed. The design and use of the forms was described as follows (McCoy et al. 2006:11):

> The site form contains spaces to indicate the current status or condition, the kind of changes or alterations that have occurred, if any, since the last inspection, and the probable causes of any such changes. Once a site is relocated, the map and description will be reviewed to determine if any changes have occurred since the last site visit, such as the addition or re-arrangement of upright stones on shrines. Any observed changes will be recorded on the existing site map and/or a sketch map, and photographed with a digital camera. The alterations should also be described in the space provided on the form.
>
> Recordation of new "find spots" can be limited to taking a GPS reading of the location, shooting one or perhaps a couple of photographs, and writing a brief description (e.g., two rocks piled on a boulder).

If the rangers are going to be a part of the monitoring program, as suggested above, then they will need to receive hands-on training on locating sites, reading site maps, and monitoring and reporting procedures, such as the filling out of field forms, recording of GPS locations, and the use of digital camera logs.

Table 4-21. Long-Term Monitoring of Historic Properties and the Historic District.

Action	Purpose	Management Areas and Monitoring Frequency	Follow-up Procedures
Systematically monitor the condition of all historic properties and the historic district Inspections note existing condition of historic properties (comparison with photographs, maps) Inspections note and document any signs of disturbance, visitation, or deterioration by natural causes Develop a mechanism for the public to report disturbances	Determine which activities are affecting historic properties Determine the degree and frequency of these effects Propose ways to prevent or minimize these effects Provide baseline information to track changes in potential effects through time Incorporate reporting system for disturbances	Routine inspection of vulnerable properties (close to roads and evidence of past disturbance) once a year Periodic inspection of selected historic properties (shrines, possible burials, cinder cones) every other year Rotational inspection of all properties over five-year period (located far from roads, no evidence of past disturbance)	Notify SHPD and the Kahu Kū Mauna Council of any disturbances to historic properties Submit field recording forms and reports to SHPD, Kahu Kū Mauna Council, and other agencies determined appropriate by OMKM

4.3.1.6 Reporting Requirements

While the completed monitoring forms will constitute a record of which sites were inspected in a given year, the results of the monitoring process also need to be incorporated into databases, since the primary objective of the monitoring program is to track the condition of all built features in the cultural landscape over time. Copies of the monitoring reports should be provided to SHPD and other agencies deemed appropriate by OMKM.

In addition to the standard reporting procedures, the discovery of any human remains or suspected human remains should be reported immediately to SHPD to comply with Chapter 6E-43 (HRS) and Chapter 13-300 of the Hawaii Administrative Rules. Any major change to a previously recorded historic site, such as the rebuilding or "restoration" of a shrine, should also be reported to SHPD (see **Section 4.3.2** below).

4.3.1.7 Plan Review

A long-term monitoring plan must contain provisions for periodic reviews of the effectiveness of the monitoring procedures and the possible need for changes and the

implementation of mitigation measures, which might include the identification of areas that should be monitored on a more frequent basis.

4.3.2 Burial Protection and Inadvertent Discovery Plan

In view of the documented existence of human burials in the Science Reserve there is a need to develop a Burial Treatment Plan (BTP) to protect all known burial sites. Given the possibility that more human remains will be found inadvertently in the Science Reserve in the future there is also a need to develop an Inadvertent Discovery Plan. Guidelines for the preparation of both plans are presented in Table 4-22 and discussed below.

4.3.2.1 Burial Treatment Plan for Known Burial Sites

A BTP s be prepared for known or suspected burial sites located in areas that are not being developed or actively used. The plan should be developed in consultation with the Kahu Kū Mauna Council, the Hawaii Island Burial Council and other interested Native Hawaiians. At present, taking specific actions to protect these sites (i.e., constructed barriers, markers, signs) could be counter-productive. Such measures tend to call attention to features that would otherwise be overlooked. There is currently no indication that known or potential burial sites are being actively disturbed or that any particular activities are causing such disturbances, but this could only be established with greater certainly through routine monitoring. An important protective measure would be ensuring that enforcement or management personnel pay particular attention to any signs that people may be visiting known or suspected burial areas.

As with other burial matters, the BTP should be reviewed by the Hawaii Island Burial Council and members of the Native Hawaiian community. The plan should emphasize the stabilization of exposed burial sites so that they can remain in place and be protected from further disturbance. If stabilization is not feasible, the burial would be with the Hawaii Island Burial Council and other Native Hawaiians requesting to be consulted in these matters.

4.3.2.2 Burial Plan for Inadvertent Discoveries in the Astronomy Precinct and Other Development Areas

According to the Master Plan the only place that the construction of new observatories and infrastructure would take place is in the Astronomy Precinct. On current evidence there are no known burials in the Astronomy Precinct or other potential development areas, which does not mean that no burials will be found in future development projects, however. The potential also exists for burials to be found eroding out of a cinder deposit along the Summit Access Road. Now that an archaeological inventory survey of the Science Reserve has been completed, any burials found in the future will be treated as inadvertent discoveries according to the procedures set forth in §13-300-40.

Table 4-22. Guidelines for the Preparation of Burial Protection and Inadvertent Discovery Plans.

Action

Adopt measures to protect burial sites in all management areas (within a non-development context) in consultation with Hawaii Island Burial Council.

Purpose

Protect known or possible burial sites from disturbance and degradation.

Determine appropriate treatment for inadvertently exposed human remains (non-development context).

Management Actions

- Prepare plan in consultation with Kahu Kū Mauna to protect known burial sites:
  - Maintain anonymity
  - Use barriers, markers, or warning signs only if determined necessary by SHPD in consultation with the Kahu Kū Mauna Council.
- Monitor burial sites and adjacent areas for signs of visitation or disturbance.
- Prepare plan for inadvertently exposed human remains [following procedures outlined in Table 4-21] (e.g., by natural processes):
  - Comply with State Administrative Rule on inadvertent burials
  - Provide guidance on potential burial treatment plan scenarios:
    1. Stabilize exposed human remains
    2. Relocate if stabilization is not feasible (rebury close to original burial location)
    3. Consider temporary repository in summit region until consultation or reburial is completed
  - Designate protected reburial areas if appropriate
- Document inadvertent burial sites and reburial sites for inclusion in historic property catalogue to ensure long-term protection and monitoring.

If human remains are uncovered when construction work is being monitored or anytime after construction commences, the procedures set out in Chapter 6E-43.6 (HRS) and administrative rule §13-300-40 must be followed. This includes notifying SHPD and the Police Department who will determine if the remains are Native Hawaiian and if the burial site is over 50 years old. If the burial site appears to be over 50 years old, SHPD has jurisdiction over the disposition of the remains but as a standard operating procedure SHPD will most likely seek the advice of the Hawaii Island Burial Council or the appropriate council members. A burial treatment plan should be prepared specifying how the burial will be protected and any appropriate procedures needed to carry out the plan, which could involve preservation in place or relocation.

If a burial is found during data recovery excavations of a site previously identified as a possible burial and it is determined to be a Native Hawaiian burial site over 50 years old it is considered a previously identified burial site and its disposition falls under the jurisdiction of the Hawaii Island Burial Council. The council will determine if the burial should be preserved in place or relocated. Whether it remains in place or is relocated, a burial treatment plan must be developed by either the entity undertaking the project or UH. SHPD will ask the burial councils to review the plan and will consider the council's recommendations. If the burial is to be preserved in place, the plan details measures that will ensure the stabilization and long-term protection of the burial site. If it is to be relocated, the plan will describe the proposed reburial site, reburial procedures, and measures to ensure the long-term protection of the reburial site. The burial treatment plan must conform with §13-300-33 or, if the remains are believed to be non-Hawaiian, §13-300-34.

All inadvertent burial sites and reburial sites should be recorded and their exact location plotted on a map so they can be included in the on-going monitoring program and protected. This information should be added to the catalogue of known historic properties within lands administered by UH or DLNR and maps showing these additional locations should be updated for use by land managers or enforcement personnel. Policies on confidentiality established for all burial site records would apply to these documents. Records of human remains exposed where there are no surface indications of a burial (i.e., mounds, platforms, in-filled cracks) are particularly important because they would indicate the presence of burials in areas that were not previously known. These areas or type of areas could then be afforded greater attention in monitoring efforts. Some remains in the more remote areas may have been exposed for many years before being discovered as is indicated by surveyors' accounts which mention seeing eroding burials on cinder cones.

Guidelines should be established to address the issue of confidentiality. A balance needs to be found between restricting information on the precise location of burial sites and having this information readily available for those with management responsibilities.

For all inadvertent discoveries that need to be removed for their protection before reburial occurs, the plan may propose finding a temporary repository in the summit region so that the remains need not be removed from the mountain while waiting for reburial. The plan could also consider designating reburial areas that would be more feasible to monitor and protect over time and identifying those individuals or groups wanting to take responsibility for the care of these remains.

4.3.2.3 Burial Treatment Plan Guidelines

To help expedite the preparation of a BTP, should one be needed, the CRMP provides some preliminary guidance on the general outline and contents of such plans and suggest some options for consideration. Many stipulations and procedures contained in these plans are relatively standard while others should consider the specific circumstances of the burial. These recommendations should be reviewed by the Hawaii Island Burial Council and other concerned members of the Native Hawaiian community.

Some options might include the designation of reburial areas to help assure the long-term protection of the remains or identifying those individuals or groups wanting to take responsibility for the care of these burial sites.

As noted earlier, the Final EIS for the proposed Keck Outrigger project included a burial treatment plan. The plan was presented to the Hawai`i Island Burial Council, but was not approved by the Council. The reason is described in a footnote in the Final EIS for the Outrigger Project:

> Following an initial informational presentation of the Draft Burial Treatment to the Hawai`i Island Burial Council in April 2004, public burial notices were placed in the newspapers in early May and an amended draft plan was submitted to the Council. The plan was discussed at the Council meeting on August 19, 2004. The members of the Council expressed their general agreement with the procedures recommended in the Burial Treatment Plan for monitoring during the Outrigger Telescopes construction and for treating any human remains uncovered during construction. Because no actual burials are known to be present, the Council took no action actually approving the plan or its procedures, concluding that this would be beyond its purview at this time (NASA 2005:xv-xvi).

Tacit approval of the draft burial treatment plan for the Keck Outrigger project suggests that that plan could be adopted with few or no changes, except for those that would pertain the circumstances of a newly found burial or burials.

4.3.3 Interpretive and Educational Program

As noted in its mission statement (see **Section 3.2.1**), in addition to protection and preservation, OMKM is also charged with the enhancement of cultural and natural resources. There are potentially several different means of enhancing the cultural resources on the mountain, some of which were considered in the SHPD Plan. The SHPD Plan presented what in effect was a conceptual interpretive and educational plan. The conceptual plan, which represents the first stage in developing an interpretive and educational program, is presented here in a slightly modified format. A few comments and recommendations have been added concerning statutory regulations and other site protection measures that should be employed in certain cases.

4.3.3.1 Conceptual Plan Goals and Components

The primary goals of interpretation and education and the management actions that need to be implemented to realize the goals are outlined in Table 4-23. The plan components are presented in Table 4-24.

Table 4-23. Interpretive and Educational Goals and Management Actions.

Purpose

Educate the public and other users about the prehistory and history of Mauna Kea.

Encourage the preservation of historic properties on Mauna Kea and their environmental context.

Inform the public about the restrictions and precautions of visiting the summit region and other management areas.

Management Actions

- Designate historic properties suitable for public visitation and minimize impact of visitation:
  - Self guided tours
  - Guided tours
  - Independent Hikers
- Prepare brochures on Mauna Kea's past including visitor precautions:
  - Develop themes for brochure
  - Develop text, select photographs, and prepare graphics for two brochures
- Develop conceptual components of display panels, text, and illustrations for expanded or renovated Visitors Center at Hale Pōhaku to include:
  - Contents focus on five major topics (see Table 4-24):
  - Develop context for the presentation of the major topics
  - Objects or replicas in display
- Compile cultural, archaeological, and historical background materials to aid staff presentations or interactions with public
- Outline major themes in more detail
- Prepare a list of frequently asked questions (FAQ)

4.3.3.1.1 Interpretation of Historic Properties

In considering how the historic properties in the Science Reserve could be interpreted, the SHPD Plan identified three potential user groups and forms of visitation: (1) self-guided tours; (2) guided tours, and (3) independent hikers (see Table 4-24). The potential benefits and drawbacks of each type of visitation were also discussed. The benefits include education of the public on the types of historic properties and their significance. The drawbacks, which would apply more to self-guided tours and independent hikers, are the potential for harm to individual properties and the cultural landscape as a whole. Table 4-24 summarizes management actions for public visitation, including the preparation of educational brochures and interpretive displays.

Table 4-24. Interpretive and Educational Conceptual Plan Components.

Public Visitation of Historic Properties	Brochures on Mauna Kea's Past	Conceptual Components of Display
Develop a policy on whether or not public tours should be permitted.	Develop themes for brochure: Prehistoric uses (adze manufacture, cultural practices, access routes, burial practices, bird catching, travel, resource gathering) Legends and traditions associated with Mauna Kea Chronology of historic-period events and uses of Mauna Kea (early visitors and explorers, cattle hunting, ranching, forest and wildlife management, scientific research) Penalties for disturbing historic properties General precautions to protect the historic district (control debris, prohibit off-road vehicle use) Develop text, select photographs, and prepare graphics for two brochures Simple brochure for casual visitors with moderate interest in the topics (used during visit, single sheet, black and white, easily reproduced) More elaborate brochure for visitors with long-term interest in the topics (kept for future reference or souvenir, larger format, color, higher quality paper)	Display contents focus on five major topics: • Adze manufacture at the Mauna Kea Adze Quarry • Cultural observances demonstrated by shrines • Burial practices in remote areas • Traditions and legends associated with Mauna Kea • Chronology of human uses Develop context for the presentation of the five major topics: • Historic district which integrates the types, distribution, and significance of historic properties • Environmental zones, geology and topography of Mauna Kea's upper slopes Objects or replicas in display: • Artifacts and faunal remains from the adze quarry • Artifacts from octopus manufacturing site complex at Hale Pohaku including octopus lure sinkers and adzes • Replica of a shrine found in summit region

Source 2000 SHPD Plan

4.3.3.1.2 Site Interpretation Compliance Issues and Recommendations

If a decision is made to allow one or more of the types of tours discussed above and to install appropriate signage, it will be necessary to comply with the requirements in administrative rule §13-277-7 which requires the following:

Interpretation Requirements. (a) When using interpretive text for signs, brochures, etc., the text shall be reviewed and approved by SHPD.

(b) Interpretive signs shall be:

(1) Of sufficient quality to enhance public understanding of the site;

(2) Culturally sensitive, based on consultation with appropriate organizations and individuals; and

(3) Located so as not to adversely affect the site visually.

(c) Any data recovery work to improve the interpretation of the site shall meet the standards set forth in Chapter 13-278.

As noted in **Section 1.6.1** if informational signs are placed at any locale within the UH management areas, the signs should include a reference to Chapter 6E-11 and the language pertaining to violations and penalties.

4.3.3.1.3 Brochures and Other Informational Material

Some educational materials, such as the brochure prepared by Kepa Maly of Kumu Pono Associates called *Mauna Kea "Ka Piko Kaulana o Ka `Aina" (The Famous Summit of the Land),* have already been prepared and are available at the Visitor Information Station at Hale Pōhaku, but there is clearly a need for even more educational materials. Guidelines for the preparation of additional educational materials and possible themes for a brochure are summarized in Table 4-25 and discussed below. The main themes include:

1. For the prehistoric period, a primary focus on adze manufacture, religious practices as represented by the shrines, access routes, and burial practices. The Hawaii Island Burial Council and other concerned Native Hawaiians would be asked to review the discussion on burials. The collective significance of the historic properties representing these uses, as expressed in the designation of the summit as an historic district, would be noted. Also mentioned would be known uses of the mid-elevation slopes where Hale Pōhaku is located. These include bird catching, travel from one side of the island to the other, and the use of resources needed to carry out these activities (water sources, bird distributions, wood). Some of the historic properties located near the mid-elevation facilities could illustrate activities that occurred at these elevations, such as the manufacture of octopus lure sinkers.

2. For legends and traditions, the text would discuss the major characters Poliahu, Līlinoe, and Kūkahau`ula and traditions alluding to Lake Waiau.

3. The chronology of historic periods uses would begin with the ascent of the mountain by early visitors and explorers; use of the lower slopes for cattle

hunting and later sheep and cattle ranching; efforts to manage the mountain's forests and wildlife; and scientific research.

Table 4-25. Themes and Recommended Content for Brochures.

Themes (1) The major prehistoric and historic activities known to have occurred on the mountain; (2) Legends and traditions associated with the Mauna Kea; and (3) A chronology of what brought people to the mountain during the historic period (i.e., 1823 to present). **Content** • At least one photograph or drawing of a shrine, a lithic scatter, cairns, and one of the cinder cones associated with a traditional goddess should illustrate these significant historic properties. • A map of the summit region best conveying the high number and wide-spread distribution of shrines throughout the summit region without providing sufficient detail to allow visitors to walk directly to the shrines. This or another map could depict the historic district and other historic properties which contribute to the significance of the district. • The location of known and suspected burial sites would not be shown. • If the proposed historic properties have been developed for self-guided tours by the time the brochure is produced, a map should be included to guide visitors to these interpretive sites. • List health and safety issues.

One brochure could be produced quickly and cheaply in black and white and another, more expensive brochure could be printed in color, on higher quality paper, and in a larger format to accommodate more text. The cheaper brochure would be for visitors who have only a causal interest in the mountain's past and will probably throw it away once it serves its purpose as a guide. The other, more expensive brochure, would be for those who are more interested in the information presented and are more inclined to keep the brochure for future reference or as a souvenir.

Portions of the brochure would warn visitors against damaging or altering historic properties and removing artifacts. The penalties for disturbing historic properties on state land should be cited (Chapter 6E-11, a $10,000 fine for each offense). The public would be cautioned about the need to control and remove any debris created during visits and reminded that use of vehicles off of established roads is prohibited. The effects of altitude and the dangers of unpredictable weather (i.e., high winds, snow, or thick mists) would be mentioned briefly as this topic is generally covered in more detail by UH in other informational materials prepared for the public.

Informational materials should also be compiled to aid those giving presentations at the Visitor Center or guided tours of the Science Reserve and/or NAR. These materials would most likely be designed to provide basic information about the history

and prehistory of Mauna Kea in more detail than would be available in the brochures or in displays. Also emphasized would be answers to some of the questions most commonly asked during site visits. The format of these materials should allow guides or rangers sufficient flexibility to adapt the information to different kinds of presentations and assist them in becoming better informed in general. The themes developed in the outline would include both archaeological topics as well as historic-period uses of Mauna Kea and would essentially expand on topics raised in the brochure or display. These materials could also be used by those giving tours of the individual observatories should they want to augment their presentation with information about past uses of the mountain

4.3.3.1.4 Displays

In addition to the need for brochures and other kinds of informational material, new interpretive displays should be installed at the Visitor Information Center. As noted earlier, the Master Plan proposes expanding and renovating the Visitor Center so only the conceptual components of the displays, general interpretive themes, and display options can be addressed until these expansion plans are finalized.

Most of the themes and illustrations proposed for the brochure would form the core presentation of the display. Panels and text could focus on four major themes of Mauna Kea's cultural past:

1. adze manufacturing at the Mauna Kea Adze Quarry (i.e., extraction of basalt, reduction of material, etc.);
2. religious observances as illustrated by the distribution of the shrines throughout the historic district;
3. use of inland, remote regions for burial; and
4. traditions and legends associated with Mauna Kea.

At least two panels should be devoted to creating a context for these activities. The first would describe the historic district as a means of integrating all the significant properties found in the summit region and should include a map showing the distribution of these properties within the context of the landscape. The second would portray and describe the different environmental and topographic zones of the mountain's upper slopes that provide a context for discussing the resources that drew Native Hawaiians to the mountain's slopes or sustained them while they were there. Some of the historic properties found in the vicinity of Hale Pōhaku could be addressed within this context. A chronology of historic-period land use and notable events could also draw on this environmental and topographic context. As with the brochure, historic-period themes would include ascents of the mountain by visitors and explorers; cattle hunting or ranching and sheep rearing, efforts to manage the mountain's forests and wildlife; and scientific research.

Although the displays would primarily be composed of text, photographs, maps, and other illustrations, two displays which include materials should be considered. In discussing adze manufacturing, artifacts and stone already removed from the quarry for various reasons could be displayed to illustrate the different implements and steps needed to take the fine-grained basalt extracted from the quarry and reduce it to the

various forms of roughed-out adzes. A similar display could address the manufacture of octopus lure sinkers in the vicinity of Hale Pōhaku and their use in fishing. For the use of shrines, a replica of a shrine could be constructed outside the Visitor Center for those who are unable to visit a real shrine, for lack of a four-wheel drive vehicle or health concerns.

4.3.4 Debris Removal, Monitoring, and Prevention Plan

As noted in the discussion of general management issues, administrative rule §13-277-6 (3) ("Rules Governing Requirements for Archaeological Site Preservation and Development") requires that preservation plans address the manner in which litter is controlled. The SHPD Plan committed to the development of a debris removal, monitoring and prevention plan to fulfill this requirement (see **Section 4.1.4**) and provided guidance on what measures should or could be employed to reduce or minimize the accumulation of debris and its effect on historic properties.

In general, it appears that the need for large-scale clean-ups, like those carried out in the past, during or shortly following the construction of the Gemini and Subaru telescopes, has decreased significantly. At least, considerably less debris was noted in during the on-going archeological survey of the Science Reserve. A decrease in the amount of trash is undoubtedly due in part to the full-time presence of the Rangers, as well as the efforts of the commercial tour operators in educating their clientele to be respectful of the mountain by not leaving litter.

The apparent decrease in the amount litter on the upper mountain, notwithstanding, the need for a debris removal, monitoring and prevention plan still exists. Some additional thoughts on the preparation of this plan and its component parts are presented below. The further development and finalization of the plan should involve consultation with all of the major stakeholders and the public at large.

4.3.4.1 Removal Procedures

To avoid potential adverse effects on historic properties during debris clean-up efforts, all participants should be briefed sufficiently to recognize shrines and instructed to exercise caution when collecting debris near them. Preferably the locations of all collection points would be selected in advance and far enough from any shrines to avoid potential adverse effects. Efforts to remove debris from the slopes of the summit *pu`u* should be designed to avoid permanent or temporary scarring of the slopes since the summit is considered sacred by Native Hawaiians.

The procedures used in earlier debris removal projects used ground crews who collected and stock-piled rubbish at several locations. The material was then removed with a helicopter in a large net. Helicopters appear to be the most effective and preferred means of removing larger quantities of debris, accumulated over time below the summit and along the roads. The volunteers who work at the Visitor Information Station could be used to assist in periodic cleanups of smaller debris, preferably in the company of the Rangers.

In addition to the usual kinds of debris left by visitors and the debris related to construction projects, the archaeological survey of the Science Reserve found the partial remains of two military helicopters and a drone that had first been seen in the 1982 archeological survey on the north slope of the mountain. Consultation with the appropriate military authorities should be undertaken to remove the last of the wreckage at these crash sites, which clearly have no place in an historic district.

4.3.4.2 Monitoring Procedures, Personnel, and Scheduling

The monitoring of debris should be done on a regular and routine basis. The Rangers, who regularly collect and dispose of rubbish during their daily rounds between Hale Pōhaku and the summit, might also be used to determine when a major cleanup project is needed by conducting periodic checks of debris below the summit and other places where debris tends to collect because of prevailing winds.

Establishing a fixed schedule for major cleanups is probably unwarranted. Instead, routine monitoring of the kind described above would be a more effective means of determining when a major debris removal project is needed. The frequency of such projects would undoubtedly vary depending on the underlying causal factors, which might include new construction projects and annual variation in the number of winter time visitors.

4.3.4.3 Preventative Measures

One preventative measure that was described in the amended SRCDP for the Science Reserve was to construct screened areas over covered containers and to place them adjacent to parking areas (Group 70 1987:89) or areas where visitors are most likely to congregate. Education is another obvious measure that could perhaps be improved with the development of more informational fliers and perhaps the addition of a few more well placed signs informing the public that leaving behind debris is particularly offensive to the Hawaiian community.

4.3.5 Emergency Plan

Emergencies were discussed earlier as a general management issue in **Section 4.1.6** where they were defined as actions which require a rapid remedy or response, and which may involve health and safety issues. Several examples were listed including the need to create a detour road, or having to remove vehicles that have gone off the road.

4.3.5.1 Management Actions

As previously noted in **Section 4.1.6** an emergency plan is needed to avoid or minimize impacts to historic properties. Table 4-26 lists examples of emergencies, the review and compliance procedures that should be followed and provisions of the plan, such as presenting a few emergency scenarios that could be anticipated on Mauna Kea. Table 4-27 outlines three potential scenarios and the actions that should be employed for each example.

Table 4-26. Historic Preservation Review and Compliance Procedures for Emergencies.

Examples	Review and Compliance	Plan Provisions
Rescue injured and/or lost member of the public or employee (skiing accident, injured hiker, injured construction worker) Retrieve large objects Collapse of road embankment or cinder cone face Need to create detour road Chemical or fuel spill	OMKM to contact SHPD for verbal consultation when feasible and appropriate OMKM to notify Kahu Kū Mauna Council	Prepare, update, and follow emergency plan that: Defines anticipated emergency scenarios Proposes contingency plans for each scenario to include: • Map showing preferred routes or remedies for scenarios • Measures to avoid historic properties and defacing the landscape: • OMKM staff becomes well informed on the distribution and kinds of historic properties in areas potentially affected by emergency activities • Staff will have ready access to maps with the locations and descriptions of historic properties • Provide training regarding protocol of historic properties • Provide Hazardous Waste (HAZWOPER) training for staff • Brief members of search teams on Cultural protocols

An important component of these contingency procedures is to make sure that UH personnel responsible for overseeing emergency efforts have ready access to maps showing the distribution of known historic properties and are familiar with the kinds of historic properties known to exist in the Science Reserve and at Hale Pōhaku. If time allows, SHPD should be notified verbally and have the opportunity to comment on any proposed remedy, particularly if the action deviates significantly from the anticipated scenarios.

Table 4-27. Emergency Scenarios.

Scenario	Location	Response Procedures	Follow-up Procedures
1-hiker with broken leg	Science Reserve	OMKM rangers would act as first responders to assess the situation, contact the appropriate County rescue unit, and provide information on the location of the incident	Letter from OMKM to DLNR on the incident, with a description of what effect, if any, the rescue had on historic properties
2-helicopter or plane crash	Science Reserve	OMKM rangers would act as first responders to assess the situation, contact the appropriate County rescue unit, and provide information on the location of the incident	Letter from OMKM to DLNR on the incident, with a description of what effect, if any the crash and rescue had on historic properties
3-forest fire	Mid-Elevation Facilities at Hale Pōhaku	OMKM and MKSS staff, who would most likely be the first responders, would implement a fire management plan if one exists and at the same time contact the County Fire Department, and if possible the local SHPD office	Letter from OMKM to DLNR on the incident, with a description of what effect, if any the fire and fire suppression efforts had on the stone buildings at Hale Pōhaku and nearby features of the Pu'u Kalepeamoa Site, such as the shrine located near the Kahinahina jeep road

4.3.5.2 Examples of Possible Emergencies and Responses

Scenario 1

Perhaps one of the most common types of emergency situations that could arise, especially with the increase in the number of recreational activities on Mauna Kea in recent years, is a hiker breaking a leg or suffering some other serious mishap miles from a road. The injured person could either be removed by stretcher, or if the injuries are more serious, a helicopter. Off-road vehicles should not be employed because of the damage that such vehicles do to the land surface, especially in areas with cinder deposits. If a helicopter is used care should be taken to avoid landing on a ridge top, which is the most common location of archaeological sites in the summit region and especially if the archaeological map shows sites in the immediate area. The first responders, which might be OMKM rangers, should check the existing archaeological site location map for the Science Reserve to find a suitable landing site and provide that information to the helicopter pilot.

Scenario 2

A military or private tour helicopter or plane crashes on the north slope of the mountain in area with a dense concentration of historic sites. The people on board are either seriously injured or die from the impact. Again, off-road vehicles should not be employed to rescue or remove the persons on board because of

the damage that is caused by such vehicles. The only recourse in this case would probably be to use another helicopter. As with the Scenario 1 example, the helicopter should avoid landing on a ridge top if there are known historic properties in the general area of the crash site.

Scenario 3

*A careless smoker tosses a cigarette into the bushes near the old stone building restroom at Hale Pōhaku (*see Figure 2-3*). It is a dry year and the lit cigarette starts a fire that quickly spreads and eventually jumps the Kahinahina jeep road that circles the mountain at about the 9,000 ft elevation. The fire does not damage the old restroom, which is more than 50 years old and therefore an historic property, but it begins to approach archaeological features that are part of the Pu'u Kalepeamoa Site. Mauna Kea Support Service personnel attempt to put out the fire, but the fire continues to spread and a call is made to the Department of Land and Natural resources for fire fighters and bulldozers to cut a fire line. The use of heavy mechanized equipment is deemed necessary to protect the Mid-Elevation Facilities and māmane forest, which is the habitat of the endangered palila. In order to protect the historic properties located just outside the UH leasehold property, OMKM rangers and/or Visitor Center personnel should consult a map showing the locations of known historic properties in the Pu'u Kalepeamoa Site and advise the firefighters operating bulldozers or other heavy equipment to avoid cutting fire lines near two shrines located on the south side of the Kahinahina jeep road. A fire management plan should be developed, if one does not already exist.*

4.3.6 Data and Collections Management

The amount of cultural resource data (e.g. site records, photographs, and maps) and artifact collections that already exist for the UH management areas and the continued collection of more in the future points to the need to develop a data and collections management system. An integrated spatial database is being created for the archaeological inventory survey of the Science Reserve. Additional data management actions are outlined in Table 4-28.

Table 4-28. Data Management Actions.

- Create a secure GIS database.
- Develop guidelines for access to and use of the GIS database.
- Contract a GIS specialist with some background in cultural resource management to maintain and up-date the database.

The archaeological inventory survey of the Science Reserve resulted in the collection of a small number of artifacts from primarily surface contexts. While the archaeological collection made during the survey is small, there is a possibility that additional material culture items may be collected in the future for educational purposes,

or as the result of the need to conduct mitigative investigations of threatened historic properties.

In the absence of an official state repository and the inability of DLNR to fulfill its statutory responsibility for curating archaeological collections from state lands as set forth in Chapter 6E-7, OMKM is committed to assuming this responsibility for the foreseeable future. This will require finding a suitable repository and the development and adoption of curation standards and procedures to safeguard and preserve the associated records and material remains.

Ideally, the collections facility would house records, photographs, reports, portable artifacts and faunal and floral materials in one place. The guidelines presented in Table 4-29 below are based on a facility with this capability. The guidelines have been adopted from a draft document prepared by Dr. Leslie Hartzell and Dr. Susan Lebo in 2001 for the Society for Hawaiian Archaeology (SHA 2001). The document was written with the hope that some or all of the guidelines would be adopted in the Hawaii Administrative Rules for SHPD (13-300). Although the guidelines were not included in HAR 13-300, SHPD should be consulted prior to finalizing the standards and procedures and developing an administrative policy since DLNR is legally the owner of all historic properties on state land and the cultural materials they contain. OMKM may want to enter into a formal agreement with SHPD regarding their responsibilities as the curator of the data and collections derived from studies of the UH management areas on Mauna Kea.

As a general policy, the records (with the exception of sensitive and thus confidential records) and material collections should be made available to qualified researchers and interested parties, such as Native Hawaiian practitioners.

Table 4-29. Guidelines for Curation Standards and Procedures

- The facility that is chosen to house the collections must be secure and climate-controlled if the collection includes perishable items (e.g. fragments of gourds, fire ploughs, ti-leaf sandals, cordage, etc.).
- An electronic accessioning system will be developed, maintained, and up-dated as needed.
- The material culture collections must have been cleaned and catalogued before they are accessioned.
- Organize, consolidate, clean, stabilize, and repackage previously accessioned records and/or material collections as time and money allows.
- Monitor collections/premises to control insect infestation and deterioration of records and material collections.

4.3.7. Priority Management Actions

At the present time not all of the historic properties in the Science Reserve have been identified and recorded. The 400 yd.-wide road easement above Hale Pōhaku (see **Section 1.3.3**) has also not been completely surveyed. Of all the management actions outlined in the CRMP there are three that have a higher priority than the others in terms of complying with Chapter 6E and the Hawaii Administrative Rules for historic preservation:

1. Complete the archaeological inventory survey fieldwork of the Science Reserve and the 400-yd. easement on either side of the summit road between Hale Pōhaku and the bottom of the Science Reserve and prepare the draft report on the survey of both management areas.

2. Prepare a Burial Treatment Plan for all of the confirmed and possible burial sites in the Science Reserve and in the road easement, if any are found, using the guidelines set forth in the CRMP.

3. Prepare and implement a final Archaeological Monitoring Plan based on the conceptual monitoring plan contained in the CRMP and the results of the completed archaeological inventory surveys of the Science Reserve and the road easement.

5.0 IMPLEMENTATION AND EVALUATION PLAN

This section of the CRMP summarizes and presents a plan to implement the primary management actions outlined in **Section 4** and to evaluate the CRMP on a regular basis and make amendments as required**.** This section also includes brief discussions of: (1) staffing needs, including training; (2) the need for on-going consultation with cultural groups, and; (3) the benefits of developing cooperative agreements to implement management actions.

5.1 SUMMARY OF MANAGEMENT ACTIONS, PRIORITIES, COST ESTIMATES AND SCHEDULING

Table 5.1 below presents the key information for the implementation plan. The 27 management actions listed in this table are discussed in detail in Section 4.0. Column 2 of Table 5.1 provides relevant references to the CRMP sections where the actions are discussed. Columns 3, 4, and 5 include a priority ranking, a relative cost, and scheduling information, respectively, for each major management action.

In Table 5.1, the management actions are listed in descending order of priority and scheduling. The priority assigned to each action (high, medium, low) correlates to its role in protecting cultural resources. The scheduling covers a five-year period for the proposed management actions; in general, actions deemed to be of a higher priority are proposed to be implemented in the first couple of years. The cost level assigned to each action is a general one ranging from a high cost ranked as “1” and a low cost ranked as “5.” A cost level of “1” is associated with actions that will likely require new or additional staff positions and/or the construction of infrastructure or facilities and/or increased funding to support staff increases and/or construction. Conversely, a cost level of “5” is associated with actions that will likely require no more than existing funding, staff, resources, or facilities.

For a number of the management actions described below, additional staff positions will be needed in order to implement them. The addition of more staff may require a combination of creating new government positions and issuing limited-term contracts with non-government entities for specific services. New positions take longer to create – any where from one to two or more fiscal years – but contract services may be procured, and terminated, relatively quickly. Any action that requires a long-term or multi-year commitment – e.g., developing and implementing the curation plan – will probably require the creation of additional staff positions.

It is possible that some of the higher priority management actions (e.g., actions involving the preparation of policies or plans) may be accomplished without significant cost. Once policies or plans are adopted and new positions created, however, the hiring and training of new or additional staff will be an associated cost. Initial training on various management actions – allowing staff to become familiar with policies, procedures, plans or regulations – will be extensive and may require some financial outlay to carry out. In subsequent years, training may be on-going, requiring yearly or other regular updates to information content, but will be lower in cost.

Table 5.1. Summary of Management Actions.

Action No.	CRMP Section References	Action Item	Priority	Cost	Schedule
1	3.2.2.4; 4.3.7	Complete the Archaeological Inventory Survey for the three U.H. Management Areas	High	1	Year 1
2	4.1; 4.1.1; 4.1.2; 4.2.3.2; 4.2.3.4	Develop a public access plan that incorporates protection measures for historic properties	High	3	Year 1
3	5.3	Develop a policy to assure that Kahu Kū Mauna is consulted on individual development projects	High	4	Year 1
4	4.1; 4.1.2; 4.2.6	Continue to prohibit the use of vehicles off of established roads	High	3	Year 1
5	4.3.2; 4.3.7	Prepare a Burial Treatment Plan	High	3	Year 2
6	4.3.1; 4.1; 4.1.1; 4.3.7	Develop a final archaeological monitoring plan and program	High	3	Year 2
7	4.2.1.5; 4.2.1.3	Develop guidelines regarding the use of ancient shrines and protocols for offerings	High	3	Year 2
8	5.3	Develop a list of individuals, families, or organizations who should be consulted when individual development projects are proposed or when other issues arise that may be a concern	High to Medium	4	Year 1
9	4.2.1.6; 4.2.1.8	Develop a policy for the construction of new Hawaiian cultural features and the long-term management of these features	High-Medium	3	Year 2
10	4.2.4	Retain commercial permitting process	Medium	5	Year 1
11	4.3.5; 4.1; 4.1.4; 4.2.3.2; 4.2.3.3; 4.2.3.4; 4.2.4; 4.2.6	Prepare a debris control and removal plan that incorporates protective measures for historic properties	Medium	4	Year 1
12	5.2	Develop staff training program	Medium	3	Year 1-2
13	4.3.1; 4.1; 4.1.1; 4.3.7	Implement archaeological monitoring program	Medium	1	Year 1-5
14	4.2.3.2; 4.2.3.3; 4.2.3.4	Coordinate hunting policies with DLNR to ensure that historic properties are protected	Medium	5	Year 2

Table 5.1. Summary of Management Actions.

Action No.	CRMP Section References	Action Item	Priority	Cost	Schedule
15	4.2.6	Develop research guidelines that incorporate protective measures for historic properties	Medium	4	Year 2
16	4.3.5; 4.1; 4.1.4; 4.2.3.2; 4.2.3.3; 4.2.3.4; 4.2.4;4.2.6	Implement debris control and removal plan	Medium	3	Year 2
17	5.2	Implement staff training program	Medium	2	Year 2-3
18	4.3.3; 4.2.3.2, 4.2.3.4, 4.2.4	Develop an educational and interpretive program that minimizes the impact of visitation to historic properties	Medium	2	Year 3
19	4.3.3	Implement the educational and interpretive programs	Medium	2	Year 3
20	4.1; 4.1.2	Develop a plan to mitigate the off-road vehicle tracks	Medium	4	Year 3
21	4.1.2	Implement the mitigation plan for off-road vehicle tracks	Medium	3	Year 4
22	4.3.6	Develop and maintain an integrated GIS database for cultural resources to include guidelines for acess and use	Medium-Low	2	Year 3
23	4.3.6	Prepare a curation plan for archaeological collections and associated records	Medium-Low	3	Year 3
24	4.3.5	Prepare an emergency plan that includes measures to avoid and protect historic properties	Low	4	Year 3
25	4.3.6	Implement the curation plan	Medium-Low	1	Year 4
26	4.3.5	Implement emergency plan	Low	4	Year 4
27	5.5	Review CRMP periodically to ensure all historic preservations regulations, restrictions, and polices are updated and revised as appropriate, and to evaluate existing management policies and the implementation of management actions	Low	4	Year 5

Finally, an assumption underlying the sequence of management actions in Table 5.1 is that necessary steps such as the passage of administrative rules and the granting

of enforcement authority for OMKM will have taken place prior to carrying out any of the listed actions. In the following subsection, each management action is briefly described and a reason is given for its inclusion in Table 5.1.

5.1.1. Descriptions of Management Actions

The following list contains brief explanations of the management actions found in Table 5.1.

1. *Complete the Archaeological Inventory Survey for the three U.H. Management Areas*. Begun in 2005, the fieldwork phase for the archaeological inventory survey (AIS) of all U.H. management areas is scheduled to be completed in 2009. The resulting AIS report will contain the baseline data for cultural resources, and will present documentation of all historic sites found, and make recommendations for their treatment and preservation. This report must be completed prior to the preparation and submittal of a final Burial Treatment Plan (Action 5), and the final Archaeological Monitoring Plan (Action 6).

2. *Develop a public access plan that incorporates protection measures for historic properties.* The issue of public access to historic properties will be addressed in the Public Access Sub Plan of the CMP.

3. *Develop a policy to assure that Kahu Kū Mauna council is consulted on individual development projects*. As the primary Native Hawaiian advisory group associated with Mauna Kea, the Kahu Kū Mauna Council should be consulted on individual development projects, in a timely and appropriate manner. The consultation policy should include mechanisms for addressing any recommendations or concerns raised by the Council.

4. *Continue to prohibit the use of vehicles off of established roads.* Unauthorized off-road vehicle use has caused serious damage to the fragile alpine environment of the summit and is therefore prohibited. Direct and indirect damage to historic properties, as well as to the cultural landscape of Mauna Kea, can also occur through unauthorized off-road vehicle use. OMKM's policy will continue this ban and strengthen measures to deter off-road use.

5. *Prepare a Burial Treatment Plan*. Once the final AIS report is completed and submitted, a Burial Treatment Plan (BTP) should be prepared for all of the confirmed and possible burial sites documented for the three U.H. Management Areas using guidelines set forth in the CRMP. The BTP will detail how the burials will be preserved and protected (including any site stabilization measures), suggest the enforcement responsibilities OMKM Rangers will have, and describe any provisions for visitation by recognized descendants.

6. *Develop an archaeological monitoring program*. Once the final AIS report is completed and submitted, the archaeological monitoring program can begin. The CRMP contains a conceptual archaeological monitoring plan (AMP) and program

on which this program can be built. The program will be guided by a final Archaeological Monitoring Plan (AMP), to be prepared and submitted to OMKM and DLNR. The AMP will include guidelines for monitoring the condition of historic properties in order to identify patterns in the alteration of historic properties. In addition, the plan will include steps for maintaining and updating the catalogue of historic properties, as documented in the AIS, and record their current condition for comparative impact assessments.

7. *Develop guidelines regarding the use of ancient shrines and protocols for offerings*. The AIS fieldwork has documented alterations made to shrines and other historic sites in the U.H. Management Areas; some of the alterations appear to be related to modern cultural and religious practices. Guidelines should be developed in consultation with the Kahu Kū Mauna Council to prevent alterations that affect the integrity of historic properties, such as the removal or addition of new upright stones.

8. *Develop a list of individuals, families or organizations who should be consulted when individual development projects are proposed or when other issues arise that may be a concern*. A list of parties to be consulted should be developed and expanded from those who participated in consultations over the CRMP, Natural Resource Management Plan (NRMP), and CMP. Development of the list should include procedures for updating it, and for ensuring prompt and accurate communications between OMKM and all parties.

9. *Develop a policy for the construction of new Hawaiian cultural features and the long-term management of these features*. The AIS has documented many small stone features of presumably recent origin that may or may not be ceremonial or religious in nature. The policy should address the construction of additional new features, and include protocols (developed by the Kahu Kū Mauna in consultation with other Native Hawaiian organizations) for how, where, and when such construction may occur.

10. *Retain commercial permitting process*. Currently, the OMKM reviews and approves commercial permit applications made by such businesses as tour operators or film companies; permit approvals may include conditions on uses or activities. These procedures will continue and be supplemented by requiring cultural orientation training for all tour operators and key personnel, on-going monitoring of commercial activities, and controlling visits.

11. *Prepare a debris control and removal plan that incorporates protective measures for historic properties*. This plan should include provisions for monitoring the distribution of debris and minimizing its escape from the observatories and during maintenance and construction work. The plan should also include measures for debris collection in publicly accessed areas and safe removal practices that will not cause damage to historic properties. Public education and positive reinforcement of public behavior (e.g., strategic placement of rubbish containers) should form a part of the plan.

12. *Develop a staff training program*. A staff training program should include basic information from the AIS on site locations and descriptions, including site and artifact recognition. Primary elements of other plans or policies – prevention of off-road vehicle use, debris control and removal, public access management – should form the basis of staff training. The program should also integrate all regulations, restrictions, and polices in a single document to aid management staff.

13. *Implement archaeological monitoring program*. Once the Archaeological Monitoring Plan is approved by OMKM and DLNR, the monitoring program can be implemented. The primary purpose of the monitoring program is to determine what uses, if any, are affecting historic properties, the degree and frequency of these effects, and ways to prevent or minimize their occurrence. Implementation of the monitoring plan will require the presence of trained OMKM staff, or a qualified archaeological consultant, who will conduct site visits to all relevant locations within the U.H. Management Areas in order to monitor uses and conditions of historic properties, as well as document and describe any impacts to these properties.

14. *Coordinate hunting policies with DLNR to ensure that historic properties are protected*. The policies should include measures for advising the public of sensitive areas, the enforcement of prohibitions on off-road vehicle driving or parking, and controlling debris. Coordination with DLNR may include a Cooperative Agreement with DOFAW.

15. *Develop research guidelines that incorporate protective measures for historic properties*. Research on Mauna Kea, for example, geological, botanical, and zoological research activities, can range from relatively low-impact efforts, such as those in which researchers hike to specific areas to record information, to more intrusive efforts such as setting up instruments to record data over time or collecting samples. Research guidelines should specify which kinds of research require permits, which agency reviews are necessary, and how permit conditions will be enforced. Information on historic properties and the need to avoid any alteration of them should also be provided to research permit applicants.

16. *Implement debris control and removal plan*. Take steps to ensure that appropriate OMKM personnel, including Rangers, are aware of the plan's measures for protecting historic properties.

17. *Implement staff training program*. Take steps to ensure that the training program includes a comprehensive review of the relevant documents pertaining to the archaeological and other cultural resources in the U.H. Management Areas as well as field trips to various site types present. Rangers should receive training in recording damage to historic properties.

18. *Develop an educational and interpretive program that minimizes the impact of visitation to historic properties*. As part of the development of this program, an educational and interpretive plan should be prepared in coordination with DLNR. The educational and interpretive plan should include educational themes,

signage (if deemed appropriate), content of the sign text, guidelines for implementation of the program, and measures that will ensure protection and preservation of any historic sites involved in the program. The program should designate historic properties suitable for public visitation through guided or self-guided tours. The program can also include development of educational brochures, displays, and materials for supporting staff presentations to the public. The development of such programs should be coordinated with OMKM, the Kahu Kū Mauna Council, and DLNR.

19. *Implement the educational and interpretive programs.* Implementation of these programs should follow steps and guidelines in the educational and interpretive plan, and should be coordinated with DLNR, and the Kahu Kū Mauna Council.

20. *Develop a plan to mitigate off-road vehicle tracks*. The plan should recommend additional barriers, provide language for signage and public information, and contain recommendations for restoring areas damaged previously by off-road vehicular activity. OMKM Rangers should be involved in the development and implementation of this plan.

21. *Implement the mitigation plan for off-road vehicle tracks*. Initially, a survey to document the location of existing off-road vehicle tracks should be conducted to ensure that mitigation efforts will not impact any historic properties.

22. *Develop and maintain an integrated GIS database for cultural resources to include guidelines for access and use.* The existing database from the AIS of the three U.H. Management Areas will be the foundation on which the integrated GIS database will be developed. Using data from the AIS and the results of periodic monitoring of the condition of historic properties, the GIS database should prove to be an effective and efficient cultural resources management tool. Guidelines regarding public access to the database and use of historic and cultural resources information should be developed.

23. *Prepare a curation plan for archaeological collections*. The curation plan should detail temporary and long-term measures for the storage of archaeological collections and associated records, in accordance with Hawaii State and Federal standards. It is anticipated that OMKM staff will need to consult with a qualified archaeological consultant or collections management specialist to develop the curation plan. The plan should specify the location(s) for curation facility, materials to be used (acid-free paper, files, and storage bags), and provisions for access and use.

24. *Prepare an emergency plan that includes measures to avoid and protect historic properties*. The plan should include anticipated situations and recommend contingency measures for each one, such as maps showing appropriate access routes and measures to avoid impact to historic sites or surrounding landscape. The plan should be prepared in coordination and consultation with OMKM Rangers and local safety officials (Fire Department, Police Department).

25. *Implement the curation plan*. Initially, steps need to be taken to locate an adequate curation facility for the archaeological collections and hard copies of the archaeological records (notes, forms, drawings and maps, etc.). Implementation of the curation plan should follow the guidelines that were developed and approved.

26. *Implement the emergency plan*. Steps need to be taken to ensure that the OMKM Rangers as well as local safety officials are aware of implementation of the emergency plan and the protective measures that need to be taken for historic properties.

27. *Review CRMP periodically to ensure all historic preservation regulations, restrictions, and policies are updated and revised as appropriate and to evaluate existing management policies and the implementation of management actions*. Periodic review will rely partly on the results of the monitoring program to be carried out as well as any changes in applicable statutes, regulations or policies. Review of the CRMP should be conducted by the OMKM, the Mauna Kea Management Board and other interested parties and stakeholders (for example, the Kahu Kū Mauna Council). Should it be decided that amendments to the CRMP are desired, the CRMP will be amended in consultation with DLNR.

5.2 STAFFING NEEDS AND TRAINING

In order to manage the cultural resources and associated data within the UH management areas OMKM should hire a qualified cultural resource coordinator to assist with the implementation of the CRMP.

The Ranger Program

Given the number of public and commercial activities and user groups on Mauna Kea, the OMKM Rangers have numerous responsibilities. The five Rangers currently stationed at Hale Pōhaku provide a number of additional services in areas that are outside of the jurisdiction of UH, including the following (Office of the Auditor Report 05-13:46).

- Monitoring neighboring DLNR forest reserve and Natural Area Reserve (NAR) lands;
- Preventing forest fires;
- Rescuing lost and distressed hikers in DLNR forest reserve lands;
- Responding to violations occurring in the NAR.
- Looking after the health and safety of visitors, including hikers. Although lacking the statutory authority to require hikers to register at the Visitor Information Station all visitors are asked to voluntarily register.

While not all of these services are directly related to cultural resource management, the high probability that DLNR will be unable in the foreseeable future to assume these responsibilities indicates that a staff of at least five rangers will be needed in the foreseeable future. OMKM and NAR are currently working on a partnership

agreement that could possibly require additional staff if, for example, the NAR was to be monitored on some regular basis.

If a decision is made to have the Rangers continue to monitor activities affecting cultural resources along the road and in the NAR, some additional training in the reporting of incidents may be required for both the Rangers and NAR staff. For example, the Rangers should receive training in recording damage to historic properties such as that given National Park rangers who need to document damage or vandalism to standards required when enforcing the Archaeological Resources Protection Act on federal lands.

A training program would also be required if a policy or protocols are developed relating to cultural practices. This assumes that the rangers would be the ones most directly involved on a day to day basis in the enforcement of a policy. Table 5-2 presents a list of management actions related to staff levels and training.

Table 5-2. Management Actions for Staffing and Training

- Assess the need for additional staff to fulfill historic preservation review compliance requirements and curation of written records, photographs, maps and material collections.
- Develop a staff training program.
- Implement staff training program.

5.3 ON-GOING CONSULTATION WITH THE KAHU KU MAUNA COUNCIL AND THE HAWAIIAN CULTURE COMMITTEE

Preservation planning recognizes the need to continue the process of consulting with the major stakeholders. A mechanism for accomplishing this goal with the astronomy community already exists in the form of regular meetings with OMKM. Periodic reviews of the CRMP would involve all of the stakeholders. In view of all of the unresolved issues pertaining to cultural practices, it is the Native Hawaiian community that needs to be consulted on a frequent basis. Some of this is presently occurring with the Kahu Kū Mauna Council and the Hawaiian Culture Committee, but it should be broadened to include more of the Hawaiian community.

Management Actions

It is recommended that OMKM continue to consult with Native Hawaiian organizations and individuals on existing policies and proposed new policies. Two specific recommendations are presented in Table 5-3.

Table 5.3. Management Actions for On-Going Consultation with Native Hawaiians.

- Develop a mechanism to assure that Kahu Kū Mauna is consulted on individual development projects.
- Provide a list of individuals, families, or organizations who should be consulted when individual development projects are proposed or when other issues arise that may be a concern.

One benefit of compiling a list of organizations and persons that should be consulted is that such a list could accommodate those who are concerned about a particular place or area but do not wish to disclose its location or the nature of its significance. They could appear on the roster as wanting to be consulted about any planned activity or issue occurring in the general vicinity and then decide if they wish to act on any concerns they have.

A more general management action, which is taken from the Policy Statement on Native Hawaiian Use of Hawaii Volcanoes National Park (revised December 30, 2003), is presented for consideration:

> OMKM will continue to meet with members of the Native Hawaiian community to ensure that there will be systematic input by the community at large regarding planning, management, and operation decisions that affect sacred materials, places, or other ethnographical resources with which they are associated. As an example, such consultations have aided in developing accurate historical and cultural resource information bases for management and interpretive needs, ensuring accurate use of the Hawaiian language in exhibits and signs, and have assisted in developing policy directed at protecting Native Hawaiian sacred sites and traditional practices.

5.4 COOPERATIVE AGREEMENTS

Cooperative agreements, such as the one currently being finalized between OMKM and NAR, can serve a number of useful functions. One particular kind of cooperative agreement, usually prepared by federal agencies that are required to comply with the National Historic Preservation Act in managing historic properties on federal lands, is the "Programmatic Agreement (PA)." Such agreements provide a mechanism by which interested parties can reach an understanding on which historic preservation review and compliance measures will be applied to particular classes of actions within a single, generally large, land holding which is being actively used and managed by an agency. These agreements are most effective when the effects of certain kinds of activities on historic properties are likely to be similar or repetitive; when the distribution of historic properties is relatively well known in the area being managed, and when similar kinds of routine maintenance activities could have an effect on historic properties. The intent of these programmatic agreements is to reduce the need for repetitive and standard historic preservation compliance reviews. This allows more attention to be paid to those planned activities which could have significant impacts on historic properties or to management areas where little is known about historic properties located within them.

In 2006 PCSI began the preparation of a PA as partial fulfillment of the recommendation for such a cooperative agreement in the SHPD Plan. The primary objective of the PA was to identify which of the many management responsibilities assumed by OMKM and/or the observatories would require historic preservation review and stipulate how OMKM and/or the observatories would comply with the appropriate State and/or Federal rules and regulations. The PA had to be abandoned because of a number of intractable problems, such as:

- As noted in the 2005 Legislative audit there does not appear to be statutory authority for some things OMKM currently carries out, such as issuing commercial permits.

- The control of various areas of the summit by different entities has resulted in a patchwork of responsibility and oversight, including activities identified in the Master Plan as potentially subject to a PA. For example, the Natural Area Reserve technically includes Lake Waiau but the Rangers, supervised by the OMKM, extend oversight to Lake Waiau.

- Management of the summit area is governed by two over-arching management documents, the approved Master Plan (2000) and the 1995 Revised Management Plan, which affects Chapter 6E compliance.

- Due to regular funding from NASA and/or NSF, there appears to be significant, de facto Federal involvement, such that Section 106 compliance may be needed; unfortunately, it also appears to be very difficult to identify the nature & extent of Federal involvement, for the most part, due to the commingling of funds.

Once the BLNR has determined that the CMP has met all of the conditions of approval it is recommended that UH and DLNR work toward developing a Programmatic Agreement for routine maintenance activities and other actions that by agreement between both parties would have no effect on historic properties and would thus not require UH to go through the historic preservation review process.

5.5. EVALUATION AND AMENDMENTS

Provisions for periodic reviews and amendments are essential components of CRMP's as changes in some of the existing management policies and compliance procedures are to be expected in the future. In addition, some of the currently approved public uses of the Science Reserve require permits, while others do not. It is likely that some of the permit conditions may change and that some currently unregulated activities may necessitate the development of a permitting process.

A process should be established to conduct a review of the historic preservation plan by the major parties affected by the plan's provisions every three to five years. These parties shall include, at a minimum, representatives of UH and any of the individual observatories wishing to participate, interested members of the Native Hawaiian community including the Kahu Kū Mauna Council and the Office of Hawaiian Affairs, and staff of the following agencies: the Office of Mauna Kea Management; the Land Division of DLNR who oversee the issuing of Conservation District Use permits; the NARS program who are responsible for managing the Mauna Kea Ice Age Reserve; the State Historic Preservation Division who review projects or actions for their affects on

historic properties, and the Division of Forestry and Wildlife of DLNR if issues of hunting or management of the *māmane* forest arise. Other interested parties, such as the commercial tour operators or recreational skiers, should be informed of the review and invited to comment if they choose. The primary intent of the review is to assess the effectiveness of the plan and its implementation, to identify any omissions, and to remove or revise provisions that have proved unrealistic.

6.0 AGENCIES AND ORGANIZATIONS CONSULTED IN THE PREPARATION OF THE CRMP

Chapter §13-277 ("Rules Governing Requirements for Archaeological Site Preservation and Development") requires that preservation plans include a discussion of the consultation process for historic properties deemed significant. § 13-277-(4) requires that:

> The agency or person shall consult with ethnic organizations and individuals for whom the historic properties are of significance. The comments on preservation treatment expressed by these individuals or organizations shall be considered when preparing the preservation plan. The plan shall include a list of individuals and organizations consulted, and shall summarize their input.

While the state rule is focused on consultation with cultural groups and individuals, other stakeholders were consulted in the preparation of this plan.

6.1 CONSULTATION WITH NATIVE HAWAIIAN ORGANIZATIONS

Consultation for the CRMP has focused on Native Hawaiian organizations, including the Kahu Kū Mauna Council and the Hawaiian Culture Committee, Hawaiian Civic Clubs in Waimea, Kona, Hilo, and Pahala on Hawaii Island, the Office of Hawaiian Affairs (OHA), Historic Preservation Committee, and the Hawaii Island Burial Council (HIBC). The sections below summarize the consultation methods used and the results of consultation with the various native Hawaiian organizations.

The consultation process will continue in the near future, following the submission of the first public draft of the CRMP to SHPD. In addition, a 45-day public review period will occur when the CRMP is submitted to SHPD.

6.1.1 Methods of Community Consultation

The focus of consultation with Native Hawaiian organizations was with small groups rather than large public meetings in order to keep the focus of the consultation on protection and preservation of Mauna Kea's cultural and archaeological resources. In the beginning of the consultation period, a series of invitations were sent to key individuals representing the various organizations, specifically the Hawaiian Civic Club (HCC) organizations, asking people to attend a meeting called by PCSI and OMKM for the specific purpose of consultation regarding the cultural resources. This evolved to asking organizations if PCSI and OMKM could be placed on their agendas to consult with them regarding protection and preservation of cultural resources on Mauna Kea.

At the beginning of each meeting, people in attendance were asked for permission to record the meeting with audio tapes, and therefore each meeting was tape-recorded. With the exception of initial meetings with the Kahu Kū Mauna Council, the contents of the meetings were summarized from the tapes instead of transcribed word for word. The meetings with the Kahu Kū Mauna Council were, however,

transcribed word for word. Because meetings with the Hawaii Island Burial Council are always taped, their meeting minutes were used to summarize the content of the consultation.

Based on the fact that it took over 12 hours to cover all the key issues addressed in the CRMP with the Kahu Kū Mauna Council, it was decided to focus the consultation on two of the more important issues: public access and cultural practices. A power point presentation was developed and shown at several of the meetings; at other meetings the slides for the power point presentation were printed and a copy was provided to people attending. These presentations covered the following:

- The purpose of the CRMP (identifies cultural resources in the UH management areas, identifies possible threats to the resources and measures to be used to protect the resources).

- Identified issues that are addressed in the CRMP, including public access, off-road vehicle use, routine maintenance, debris, enforcement, emergencies, film industry, cultural and religious practices, astronomy, recreational activities, commercial tours, commercial events, and future land use).

- More detail concerning public access (currently no rules; altering historic properties is illegal but most visitors are not aware of this).

- Summary of management actions regarding public access (visitor registration and education, ranger presence, monitor effects on historic properties, enforce preservation laws, and provide signage).

- More detail concerning cultural and religious practices (offerings, burial site access, visiting ancient sites, constructing new features, scattering ashes, and stacking rocks).

- Summary of management actions pertaining to burial site access (no restrictions for native Hawaiians, advance notification of visits, burial disturbances reported to rangers and SHPD, and no public tours to burial sites).

- Kahu Kū Mauna Council – they will review, together with the MKMB, all recommendations and decide which to adopt in the CRMP. To achieve this, they will consult with other Native Hawaiian organizations, individuals, and families.

Ms. Maria “Kaimi” Orr of Kaimipono Consulting Services, LLC (KCS) served as meeting facilitator for the consultation meetings, and Ms. Denise Russell of PCSI assisted with meeting logistics (obtaining meeting locations, providing refreshments for the meetings, and transcribing meeting minutes).

The power point presentation was followed by a discussion session and questions and answers. The discussions often focused on issues surrounding public access and cultural practices and the recommended management actions needed to protect cultural sites within the context of these issues.

The meetings held for CRMP consultation are summarized below starting with consultation with the Kahu Kū Mauna Council members. These are followed by summaries of consultation with other organizations and individuals. Appendix F presents a list of groups, agencies and individuals consulted for the CRMP.

6.1.2 Consultation with the Kahu Kū Mauna Council

The two meetings with the Kahu Kū Mauna Council took place on March 1 and March 5, 2008. Attending the March 1st meeting were Kahu Kū Mauna Council members Arthur Hoke, Larry Kimura, Leilehua Omphroy, Toni Mallow, Tiffnie Kakalia, Hannah Kihalani Springer, and Ed Stevens. Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr of KCS, and Pat McCoy, Steve Clark, and Denise Russell of PCSI.

Attending the March 5th meeting were Kahu Kū Mauna members Arthur Hoke, Larry Kimura, Sean Naleimaile, Toni Mallow, Tiffnie Kakalia, Hannah Kihalani Springer, and Ed Stevens. Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr of KCS, and Steve Clark, and Denise Russell of PCSI.

The consultation meetings with the Kahu Kū Mauna Council included extensive and intensive discussions of the issues addressed in the CRMP. The input provided by members of the Council led to significant change in the content of Section 4 of this CRMP, especially in the recommended management actions designed to protect the cultural resources identified within the UH management areas on Mauna Kea.

Some of the issues discussed in these two meetings are very complex and involve social, cultural, and political factors that transcend the ability of one organization to resolve. Instead of detailing the extensive input here from members of the Kahu Kū Mauna Council, this subsection will list issues that will require more internal discussion and consultation by the Kahu Kū Mauna Council and possibly between the Council and other Hawaiian organizations, stakeholder families, and individuals.

6.1.2.1 General Management Issues

- Some of the members of the Kahu Kū Mauna Council see a need to protect more of Mauna Kea, including cultural and natural resources, than what is included in the UH Management Areas. Some believe that Hopukani Springs should be included, some believe everything above the 9,000 foot elevation should be protected, others feel everything above the 6,000 foot elevation should be protected.

- There is a need for OMKM to hire more rangers for enforcement, although this may have to wait until OMKM has promulgated regulations.

6.1.2.2 Protection Measures for the Current Policy of Uncontrolled Access

- Recommendations for controlled access to Mauna Kea should include guided tours/shuttle from Hale Pōhaku. The concept of shuttling everyone up to the

summit from Hale Pōhaku was seriously considered and included arguments for and against. The working concept is that non-residents (visitors) would pay a fee and state residents would be shuttled for free. It is important to be mindful that before times, under the *kapu*, there were likely many rigorous restrictions to access to Mauna Kea's summit region.

6.1.2.3 Management Actions for Off-Road Vehicles

- Will air conveyance fall under this category? Should low-flying aircraft (airplanes and helicopters) be allowed to fly low over the summit for purposes such as research or scattering human ashes? There is a need to further discuss if a policy for this is required.

- DLNR needs to support OMKM's current policy of no off-road vehicles allowed in the Science Reserve because DLNR has administrative authority over lands adjacent to the Science Reserve and the Science Reserve can be accessed through these lands with off-road vehicles such as ATVs.

6.1.2.4 Management of On-going Maintenance Activities Requiring Historic Preservation Review and Compliance

- OMKM needs to develop a list of possible actions/activities that can be covered under a cooperative agreement with SHPD, eliminating the need for approval for proposed projects on a case-by-case basis. There is a need to create an agreement similar to a Federal Programmatic Agreement.

6.1.2.5 Management Actions Pertaining to Offerings

- There is a need to develop protocols for placing offerings and removal of offerings. This issue is very complex and requires further discussion among members of the Kahu Kū Mauna Council and probably between the Kahu Kū Mauna Council and other Hawaiian organizations, families, and individuals.

6.1.2.6 Management Actions for Access to Burial Sites

- There needs to be more discussion regarding the confidentiality of burial site locations and who should have access to this information. The question was raised about possible violations to the Federal Freedom of Information Act or the State Uniform Information Practices Act if burial site locations are kept confidential.

6.1.2.7 Management Actions for Shrine Visitation and Use

- There is a need to develop protocols for visitation and use of ancient shrines and leaving/removal of offerings. This issue is very complex and requires further discussion among members of the Kahu Kū Mauna Council and possibly

between the Kahu Kū Mauna Council and other Hawaiian organizations, families, and individuals.

6.1.2.8 Management Actions for Construction of New Features

- There is a need to develop protocols for constructing new features and dismantling new features. This issue is very complex and requires further discussion among members of the Kahu Kū Mauna Council and possibly between the Kahu Kū Mauna Council and other Hawaiian organizations, families, and individuals.

6.1.2.9 Management Action for On-Going Consultation

- There is a need for more discussion on the types of consultation that may be needed in the future and whether or not the consultation needs to include groups other than the Kahu Kū Mauna Council.

6.1.3 Consultation with the Waimea Hawaiian Civic Club

The presentation for the Waimea Hawaiian Civic Club began at 6:30 p.m. on April 17, 2008. Attending the presentation were the following: Sharon Medeiros, a cultural practitioner, Maile (Spencer) Napoleon, a Waimea resident, Anne Dressel, a guest, Betty and Fred Lau, with the Waimea Hawaiian Homes Board and Waimea Hawaiian Civic Club, Ku "Clarence" Ching, a farmer, Kanani Kapuniai with the Waimea Hawaiian Homesteaders Assn Inc., and Reynolds N. Kamakawiwo`ole a former Kahu Kū Mauna Council member. Also in attendance were Arnold Hiura of OMKM, Maria "Kaimi" Orr with KCS, and Pat McCoy, Steve Clark, and Denise Russell with PCSI. The meeting was held in Waimea at the offices of the Canada-France-Hawaii Observatory.

The following points summarize the input regarding issues of public access and cultural and religious practices:

6.1.3.1 Public Access

Visitor Registration

- Having visitors register is a good idea for safety reasons.

- There likely will be some resistance by contemporary cultural practitioners to register. There's a difference between people who are *ma`a* (experienced; knowing thoroughly; familiar) with Mauna Kea and those who are *malihini* (newcomer, tourist; one unfamiliar with a place or custom).

- There should be restrictions to public access that are within reason.

- Visitor registration is important but difficult to regulate and impractical. Education is the key.

- Hawaiian cultural practice is a living, dynamic thing – it is not static. Restrictions on public access should not be too inflexible and controlling.

Visitor Education

- Visitor education is the key, but how will this education process be structured?

- Who will pay for monitoring and education? There could be a terrific curriculum; if there's a curriculum for the fruit-fly, there could be one for education about Mauna Kea.

OMKM Rangers

- How do two Rangers police the entire mountain? There needs to be more money appropriated to hire more Rangers.

- It depends on what the plan says. If the plan says no restrictions, what are more Rangers going to do? If the plan says you can not do this and/or that, then we will need more eyes and ears on the Mountain; staffing needs will need to be reassessed.

- The State is the trustee so preservation laws are not the best determinant for what we do up there. These laws treat the culture as if it's static and it's not.

- Maybe we can have a little bit of both? Talking about the adze quarry, there are Hawaiians who make adzes and yet there is no allowance for them if you go by the laws. Why can't a part of the mountain be set aside for contemporary use and practice? A balance…something new.

6.1.3.2 Cultural Practices

Offerings

- Who are we to say what practitioners place and what is acceptable or not? How can we determine what is *pono* (correct)?

- The proper intent must be there; if it's not *pono*, it shouldn't be there. People need to be educated spiritually. They need to practice right.

- There should be no food on altars on Mauna Kea or the Volcano – that shouldn't happen. Somebody sees this happening and then you will have copy-cats.

- Traditional Hawaiian cultural practices do include food items, so again, where do you draw the line if you're going to be traditional?

- No opposition to removing offerings immediately after being offered. Another part of education that makes sense.

Burial Site Access

- Advance notice for burial site visitations seems to be too intrusive. The families that practice in this way may know Mauna Kea better than some of the Rangers.
- Health and safety issues are a big concern on Mauna Kea and should be included in all the plans.
- How does a Ranger know if a burial practitioner has left Mauna Kea?
- There is full agreement regarding no public tours of burial sites.

Scattering Human Ashes

- Mauna Kea is sacred and there should be no ashes.

Constructing New Features

- What makes the Kahu Kū Mauna Council the experts to say what is appropriate?
- This is tough; trying to fit Hawaiian into a Western mold; this is a complex issue.
- How do you control what is *pono* for every family? Control spirituality? How can guidelines be developed for something that's not uniform?
- The bottom-line still is should Government regulate the practice of religion?
- According to State Law and the Constitution, the cultural use of Mauna Kea is one of the paramount things on the Mountain. Many people, especially Astronomers, think the primary use of the Mountain is for Astronomy. It is not. Astronomy is below cultural uses. We need to understand that culture does not serve the observatories. The OMKM mission statement elevates the status of astronomy to the same level of cultural practices, which is incorrect.

Piling Rocks

- There is a concern that it is not okay to remove rocks in an "appropriate manner". What is culturally appropriate?

6.1.4 Consultation with the Kona Hawaiian Civic Club

The presentation for the Kona Hawaiian Civic Club began at 6:30 p.m. on April 22, 2008. Attending the presentation were the following: George K. Kahananui, Sr., Annie K. Coelho, and Aaron Kahananui (no affiliation noted) and Robert Boenig (guest). Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr with KCS, and Pat McCoy, Steve Clark, and Denise Russell with PCSI. The meeting was held in Kona at the King Kamehameha Hotel.

The following points were considered to be key comments regarding issues of public access and cultural and religious practices:

6.1.4.1 Public Access

Visitor Registration

- You have to start somewhere (with registration); to protect everybody in terms of where they're going…it depends on what their business is up there.

Provide Signs

- Signs might mean no more alteration but it's not good to plague Mauna Kea with too many signs and make it look unnatural; this has to be weighed out for cultural practices.

Visitor Education

- OMKM has to preserve the area; show/teach those who do not understand the right way. The problem is between those who do and do-not understand.

6.1.4.2 Cultural Practices

Offerings

- The *lele* (altar) should be left to fall on their own – if they don't stand, they weren't meant to stand. No one should dictate how to worship.

- [Regarding littering…] If the observatories are allowed to keep building, why can't Hawaiians build their offerings?

- [Regarding placement of Tibetan flag…] Do what you have to do to worship, and then remove it after proper respects are paid.

Burial Site Access

- Advance notification wouldn't hurt.

Scattering Human Ashes

- The stated management actions sound good.

Shrine Visitation and Use

- Establishing lineage of "native" Hawaiians is difficult; visitation is okay as long as people are respectful.

New Cultural Features

- Guidelines of a Council will provide some control.

Piling / Stacking Rocks

- This practice can get carried away.

Kahu Kū Mauna Council

- It's a good idea to have this Council in place – a positive outcome; they will generate more respect with regard to proper protocol to appease everyone.

6.1.5 Consultation with the Hawai`i Island Burial Council

The presentation to the HIBC began around 11:30 a.m. on June 19, 2008. Attending the presentation were the following HIBC members: Charles Young (Chair), Kaleo Kualii, Kimo Lee, Roy Helbush, Leningrad Elarionoff, Ronald Dela Cruz, and Cynthia Nazara. Also in attendance were Stephanie Nagata (OMKM), Ed Stevens, Arthur Hoke, Toni Mallow, and Tiffnie Kakalia of the Kahu Kū Mauna Council, and Steve Clark and Sara Collins of PCSI. SHPD staff members Morgan Davis, Theresa Donham, Wendy Machado, and Nancy McMahon were also present.

The summary presented below is derived from the published minutes of the HIBC meeting. The first half of the consultation with the HIBC consisted of an informational presentation. For the second half, the HIBC went into executive session (closed to the public) because descriptions and locations of burial sites were going to be presented.

During the information presentation, Dr. Collins explained that PCSI had almost completed the archaeological inventory survey of UH management areas on Mauna Kea, was preparing a CRMP for OMKM, and that PCSI staff members had been working closely with OMKM and the Kahu Kū Mauna Council. This council is a Native Hawaiian advisory group that works closely with OMKM on the treatment and protection of historic and cultural sites in the UH management areas.

Stephanie Nagata, the Interim Director of OMKM, indicated that this office was created in August 2000, and is responsible for managing the summit and for preserving and protecting the summit resources in order to provide a world-class center for research and education. Kahu Kū Mauna advises OMKM on cultural issues. She introduced members of the Kahu Kū Mauna who were present.

Mr. Ed Stevens of the Kahu Kū Mauna Council thanked the HIBC and said that the Council members are guardians of the mountain, and they see Mauna Kea as their *kuleana*. He explained that the members of the Council want to open up communication and work together with the HIBC to have a cooperative relationship with the concerns of Mauna Kea. He indicated that the Council has nine members dedicated to preserving

the culture, the artifacts, and all that is dear, and offered their services to the HIBC when discussions are needed.

Dr. Collins then explained that the CRMP was developed in order for UH to fulfill its mandate to preserve and protect the cultural resources in the areas managed by OMKM. UH has to comply with the terms of its 1968 lease agreement, it has to comply with all applicable State and Federal Historic Preservation laws and regulations. The CRMP is a document being prepared under State law, 6E-8, not part of a Federal action. Another requirement that the CRMP has to comply with the conditions pertaining to the management of cultural resources, in the 1995 revised Management Plan for the UH management areas.

Dr. Collins identified the three UH management areas addressed in the CRMP, and indicated that the Natural Area Reserve will not be included in the CRMP. She explained that one of the requirements of a CRMP is that it be acceptable to all the major stakeholders including DLNR, native Hawaiian practitioners, conservationists, and other groups. She indicated that PCSI has been and is currently meeting with groups on Hawaii Island for consultation. PCSI's consultation for the CRMP began with discussions with the Kahu Kū Mauna members who offered many comments and revisions that have been incorporated into the CRMP. As more comments and suggestions are received, they will be considered because the CRMP is not yet final.

During the presentation, it was explained that there were numerous burial and possible burial sites found and recorded during the inventory survey of the UH management areas and are considered previously identified. None are within the Astronomy Precinct. Any burials found in the future will be treated as an inadvertent discovery.

Mr. Elarionoff asked who would have the expertise to determine if burial remains are 50 years or older. Dr. Collins replied that SHPD staff will make the determination. Mr. Elarionoff asked for clarification on the action taken with burials being 50 years or older and burials determined to be less than 50 years old. Dr. Collins indicated that when a burial is found, the first determination made is whether or not the remains are human. The second determination made is whether or not the burial is over 50 years old. If the remains are 50 years or older, the burial can be termed "historic" and SHPD gets involved. If the remains are younger than 50 years, the burial find needs to be reported to the police.

Mr. Elarionoff asked for clarification on the words used in one of PCSI's information handouts. One line said that the Council will determine, another line said that the SHPD will consider. First it says that the Burial Council makes the decision and then it says that SHPD makes the decision. Dr. Collins said that the wording is referring to the plan not the decision making. The burial council decides to preserve in place or relocate, along with additional recommendations.

Mr. Elarionoff then asked for clarification on who will review the CRMP periodically and revise appropriately. Dr. Collins said it would be the OMKM, SHPD, and the Kahu Kū Mauna and other stakeholder groups.

Mr. Dela Cruz asked if there were any large structures by the *piko*. Dr. Collins said there is or was a *lele* right by the summit, and that modern day practitioners constructed it. Mr. Dela Cruz said that the people who built the *lele* did so with the best intentions but if our *kūpuna* felt it proper to build structures by these sacred sites, they would have done so. Nothing visual needs to be put there to enhance the sacredness of this *piko*. Mr. Ed Stevens said that he agreed with Dela Cruz and that they are working on this concern.

Mr. Kualii said that some of the concerns are that people go to Mauna Kea and practice a culture that they developed on their own. Mauna Kea is very sacred to us, and the Council extends their welcome to share *mana`o* on these issues.

Mr. Young asked about jurisdiction on Mauna Kea - how the land is being used and who is taking authority. Ms. Nagata said that the land is leased to UH who sublets the property to the observatories. The 525 acre Astronomy Precinct is the only area where future development can occur. Young asked for public comment; there was none.

6.1.6 Consultation with the Office of Hawaiian Affairs, Native Hawaiian Historic Preservation Committee

The presentation to the OHA Native Hawaiian Historic Preservation Committee (NHHPC) began at around 11:30 a.m. on June 30, 2008. Attending the presentation were the following NHHPC members: Monica Bacon, Dr. Charles Burrows, Leslie Burrows, Jeno Enocencio, Ke`eaumoku Kapu, Christopher Kauwe, Kamika Kepaa, Arthur Hoke, Kealakahi Meyers, Benjamin Noeau, Ke`ala Soares, Noelani Watanabe, Apolei Bargamento, Sweet Mathews, Keola Lindsay. Also in attendance were Stephanie Nagata and Arnold Hiura of OMKM, and Sara Collins and Steve Clark of PCSI.

There was a question and answer period after the presentation. Questions and subsequent responses included the following:

- Question: How many rangers does OMKM have on Mauna Kea and are they working 24/7?
  Response: There are five rangers working on Mauna Kea. Although there are rangers up on the mountain 24/7 - they live and work up there in shifts -, the ranger's working hours are from 7:00 a.m. to 10:30 p.m.

- Question: Do Hawaiian people travel up to Mauna Kea to visit burials?
  Response: Yes.

- Question: Why was a CRMP not developed prior to this time?
  Response: OMKM was not formed until the year 2000. Prior to preparing a CRMP, it was important to conduct an archaeological inventory survey to determine the nature and extent of archaeological and other cultural resources in the UH management areas.

- Question: How long is the CRMP good for?
  Response: The CRMP is adaptive; it can be reviewed and amended as appropriate.

- Question: Where does the current funding for this come from?
  Response: This is funded from the University of Hawaii budget. The UH President wants to make funding a line item in the next legislature.

- Question: What percentage of funds comes from site users?
  Response: The University did not have the resources to build telescope facilities for its research use. Instead of collecting monetary rent, UH has received a percentage of viewing time from each telescope.

- Question: Are you trying to collaborate with the NAR to increase the NAR holdings?
  Response: There is a Mauna Kea Ice Age Natural Area Reserve already on Mauna Kea and we are not advocating increasing or decreasing the NAR.

- Question: Is the CRMP in draft stage?
  Response: Yes, we should have a draft of this document by early fall.

- Question: What is HRS 343 and does preparing the CRMP require OMKM to comply with 343 [i.e., do you have to do an EA or EIS in order to do this plan]?
  Response: It was explained what HRS 343 is and that the CRMP is being prepared as a State action; it is not project driven and does not need an EA or EIS.

- Question: How are you defining cultural resources?
  Response: Archaeological sites, traditional cultural places and traditional practices associated with some of the archaeological sites.

- Question: Why was the term "*kahu*" selected for the name Kahu Kū Mauna?
  Response: It is based on the term "*kuleana*"…the mountain is our *kuleana* to care for.

- Question: Isn't there a conflict of interest…the State is the landlord (DLNR) and the State is also the lessee (UH). How can the State make decisions for the State? People outside the State should make the decisions.
  Response: Management of Mauna Kea prior to 2000 was from Manoa. The Office of Mauna Kea Management on Hawai`i Island was formed so control and management is now based Hawai`i Island.

- Question (from the Chair of NHHPC): How can the NHHPC help you?
  Response: We would like comments and recommendations on the CRMP from the NHHPC.

- Question: Is a draft CRMP available for us to review?
  Response: Not yet.

- Question: Do we provide comments based on these handouts? It's hard to generate comments based on the handouts. When can we get a copy of the draft CRMP?
  Response: It will be available later in the fall.

- Question: What is the protocol in place to avoid bringing in invasive plant species up to Mauna Kea?
  Response: We're working on a Memorandum of Agreement with Pohakuloa Training Area (PTA) to use their vehicle washing facility to wash down construction trucks before they go up to Mauna Kea.

In addition to the questions and answers, several comments were provided. These include the following:

- Noelani Watanabe commented about visiting a New Mexico tribal area and being impressed with rules on the reservation and how well they took care of their sacred places. The rules were good because they let people know what they could or couldn't do.

- Ke`eaumoku Kapu commented that OMKM should look into Act 212 regarding traditional management processes - *aha moku*. He recommended that we look into this and consider supporting because could be beneficial.

- The Chair of the NHHPC asked Mr. Arthur Hoke to come up and provide some insight regarding Mauna Kea. Mr. Hiura commented that there is no rule making authority to do anything at Mauna Kea! We don't have all the answers but we're trying. I believe we should have controlled access to monitor how and when people go up to make sure you're not making *kolohe*. This includes our own people too.

- Some concern was expressed about the influx of people from other nations to build telescopes. There was a suggestion is to tear down observatories that are obsolete and build new ones where the old ones are.

6.1.7 Consultation with the Hawaii Island Civic Clubs in Pahala, Hawai`i

The presentation for the Hawaiian Civic Club meeting in Pahala began at 9:30 a.m. on August 2, 2008. This meeting included HCC members from all over Hawai`i Island. Attending the presentation were the following: Mabel Tolentino (Waimea HCC), Sam Moniz (President, Waimea HCC), Lucille V. Chung (Laupahoehoe HCC), Nani Langridge (Prince David Kawananakoa HCC), Shirley Kanehailua (Laupahoehoe HCC), Les Goveia (Ka`u HCC), Anna Cariaga (Ka`u HCC), Raylene Moses (no affiliation noted), Christine Naito (President, Prince David Kawananakoa HCC), Andy Wynn (President South Kohala HCC), Kaena Peterson (Vice President South Kohala HCC), Lily K. Pa (Hilo HCC), Paulette Ke (Hilo HCC), Martha McNicoll (Hilo HCC), Ann K Nathaniel (Prince David Kawananakoa HCC), Moana DeLeon (no affiliation noted), and Ruby McDonald (Kona HCC; President [Chair] Assoc. of Hawaiian Civic Clubs, Hawaii Island).

Also in attendance were Stephanie Nagata of OMKM, and Pat McCoy, Steve Clark, and Denise Russell with PCSI. The meeting was held at the Pahala Community Center in Pahala, Hawai`i.

The following points were considered to be key comments regarding issues of public access and cultural and religious practices:

6.1.7.1 General Comments

- It would be helpful to provide an overview of the various components of these plans, including the various steps necessary for submission of the draft report, at the beginning of each presentation. Many members of the community are not familiar with the different components and find the presentation confusing.

6.1.7.2 Public Access

- We used to go up to the Mountain to play in the snow; the problems started with us when they put those "pimples" up there (referring to the observatory domes). I can understand having controls when conditions are hazardous but do you control people going up to ski?

6.1.7.3 Cultural Practices

Offerings

- There are certain protocols for certain rituals regarding food. The food had to be eaten on-site by certain people, not left there.

Scattering Human Ashes

- It is not good to have to get a permit to scatter our ashes; It takes too long to get permits; everything has to go through Honolulu. Perhaps instead the Hawai`i Island Burial Council could help with this?

- Has there been any consideration of past practices?

Piling / Stacking Rocks

- It is important to educate people about how and where to stack rocks; they should be stacked away from public view.

- It is private and personal. Anyone wanting to put an *ahu* up should find out the reason why an *ahu* is built.

- Because it's a shrine, they should put rules & regulations (signage) stating this is a sacred area and for religious reasons, visitors should not build shrines.

- One of the reasons Hawaiians piled/stacked rocks was to mark the boundary of the *`aina* (land).

Provide Signage

- Signage in different languages should be considered.

6.1.8 Consultation with the Hilo Hawaiian Civic Club

The presentation for the Kona Hawaiian Civic Club began at 6:00 p.m. on August 11, 2008. Attending the presentation were the following: Aileen Hussey, Toni Mallow, Arthur Hoke, Kris Hoke, Paulette Ke, Jerry Konanui, Sibi Hoke, and Martha McNicoll. Also in attendance were Stephanie Nagata of OMKM, Maria "Kaimi" Orr with KCS, and Steve Clark, and Denise Russell with PCSI. The meeting was held at Hawaii Community College in Hilo.

During this meeting, there were many comments and much discussion on public access issues, as well as questions and answers. The critical comments and some of the relevant questions are presented below (with answers in parentheses).

6.1.8.1 General Comments

- With regard to recreational activities, has there been any correlation to what's taking place today and whether this is a historical activity? There seems to be a belief that there is a right to ride snow boards. It's likely that snow-play did not occur in ancient times.

- Is there any effort to incorporate what's happening in the NAR into the CRMP? A process to incorporate? (What we could think about is once we get our CRMP and once the NAR does their management plan, because of the MOU we want to develop with the NAR, maybe there is some way for us to segue something so that it's a contiguous landscape. We look at the mountain culturally as a contiguous landscape but we also have to operate within the jurisdictional boundaries. That doesn't mean we can't cooperate – the idea is to cooperate between the two agencies).

- Do the Rangers carry guns? (No they do not. They are not authorized enforcement personnel).

- Are all the sites documented to the point where there's actual visual? (Yes, plan view maps have been drawn and all the sites have been photographed).

6.1.8.2 Public Access

Visitor Registration

- There is agreement that the process at the Volcano National Park where you have guided access and then you have the educational perspective is a good one. This is so important because people won't know what they're doing if they

weren't educated and then to realize what has been mistakenly done, thinking then it was something special actually destroyed the entire meaning behind it. And they don't know about all the defacement they might be doing; it robs the original [intended] meaning of the Hawaiians. People don't realize the disrespect they are doing to our *`āina* and to our *keiki* and what they're going to be instilled with. It's confusing. This is why education is so important.

- It looks like the Kahu Kū Mauna Council members are taking care of the problem with the new construction (of sites) not meeting council guidelines, so isn't it so? For me, if you're talking about having genealogy before you go up there, as a cultural practitioner, I've never been up to Mauna Kea but I see in the future I want to do that but I also understand protocol. If you come down to Puna to my area, we have people to guide you, so to me, if you have an organization such as the Kahu Kū Mauna Council or people who have legitimacy being practitioners up there, for me as a practitioner who has never been up there, they are the people I will consult. Education is most important whether it be the tourist or the cultural practitioner going up there. We have to follow that protocol up there. I know when we look at new cultural features – a good example of this is down along Queen Ka`ahumanu Highway with all the coral graffiti, but I also would like to say that those are the people that don't know. There are some of us who are very interested in practicing our cultural traditions and we would like to expand our domain as far as our Hawaiian rights to do what is appropriate providing protocol, which is why I feel those things need to be in place very quickly.

- It's not whether my protocol is different from another person; the basic thing that happens is that's your *`āina* (referring to Kahu Kū Mauna Council) – you're up there and that's your place. If I want to come in, I don't just come in without asking! I ask for permission and I ask for the people who are the practitioners that if I can come and I can do. They should ask what I want to do and tell me if something is inappropriate. I don't challenge them and say "I have to do mine", that's disrespect for the people who *malama* that place. That is the most important thing – who is the *kahu* up there? Who has the experience? That's where I go.

- Is there a record of who the *kahu* were on Mauna Kea? Was it recorded in a chant? (It depends on what area you're talking about. If you go back far enough, the *mo'i* of the island was the one that was all power and designated certain people in the district but most likely we've lost the record of who those chiefs were. But that was one small window in time too and then when you came down to the Mahele that was still another window in time in which certain people were given different *ahupua`a* and then after the provisional government, all that went out the window).

- Our culture is ever-growing, ever-expanding and we need to go back in history – we need to know who the *ali`i* were up there and the *ahupua`a* system. It's difficult to say who's going to run it now, but if we have the history of what was done there, who did it and we have these people to assist in setting up the protocol – you'll never get it perfect – at least we'll have something that works when we want to come up – somebody to establish. So go back in history, find

all those who've been there before, find out what their protocol has been, and then come to a consensus for the modern times. We have to be flexible, like our culture is. It is difficult but not impossible. For sure we need to go back and set protocol so we can go from here to the future.

- We've been told by some cultural practitioners that they don't want to have to tell somebody else because it's their *kuleana*. That's going to be such a challenge for the Kahu Kū Mauna Council.

- If Mauna Kea is not your place of cultural practice, you need to go to the Kahu Kū Mauna and get permission to do that. You don't just go up and build an *ahu* on the summit – and that's what people are doing today.

- The adze-makers – that was their place and then other people who had burials – I think we've lost a lot of them in the ancient times; the burials could be connected to the adze makers. It seems like they were the ones who go up there first before you had the *ahupua`a* divisions, you had the adze quarry. If you have all of these different levels, as a cultural practitioner you know who you're supposed to address at each particular level as well as the one for now.

- I've done research on my family genealogy, and I've found that it is considered *kapu* too and not to be shared outside of the family. I think you would have a lot of difficulty because you have a lot of families who still hold to that tradition and will not release that information to anybody. You're going to run into that.

- Yes, what we've found lately is because a lot of the practitioners are coming out and we have many who say this is what my family practices – this is ours. It is not to say that it is not yours but they are now exposing themselves to myself and friends of mine so we can reinforce our *`ohana* traditions and then when we get into something a little different or a higher level – it's like a *hula halau*, not all knowledge comes from one – so you go and you learn and you feel what is adjusted to your *`ohana* and this is what you want to keep and take, that's where you go. I am thankful I understand and even my family does there are certain places you do not go. I have a lot of respect for that. We will overcome all our obstacles.

- Controlled access is needed so we know who's going up there; we can advise/educate them. But we need rules and regulations – without that, none of this has any impact.

- Several cultural practitioners have told me that the greatest gift of respect you can give a site or place is your *leo* (your voice); if we can pass that around as education, it would solve a lot of the problems. This gift of speaking your name has so much more *mana* than giving a rock or crystal. Maybe it would help turn this around. I was taught whenever you go to a place you don't need to bring things. Just say who you are and where you come from – this means more than putting any rock there.

- Have you considered adding a toll-gate like they have at Volcano? We've talked about a gate or a booth as a means of controlling access - the purpose of the booth would be to provide information to people, to make sure they are safe.

- What if we allow people to go up for 8 or 12 hours? If they want to go up to watch sunrise or sunset, then come down? (When I was chairman of the management board, my concern was "vicarious liability" – trusting the University to "do the right thing". It means that if you did not do everything within your power to make sure nothing bad happens to somebody, you are liable. You have to be prepared for every possible situation that could occur).

- There is a recommendation for controlled access – block it all off. No private cars past the Visitor Information Center – including astronomers. OMKM provides vehicles and everyone gets shuttled up and back down. Then you identify everybody - if you're not a local resident, you have to pay a fee. If you're a Native Hawaiian or a local resident, we take you up for free. The educational aspect is taken care of on the shuttle. It takes time to drive up there so you have a captive audience.

6.1.8.3 Cultural Practices

Offerings

- If you have a shuttle that picks up people and takes them to a site, they could be educated on during that ride. Some of those rocks are just put there because they think it's great when actually there is meaning for putting them there. And the ashes should be scattered, not the urn. These are the kind of rules that can be taught to the people when they go up there. They shouldn't put those stacked rocks any place – look at the Queen Ka`ahumanu highway, it's a mess and we don't want that mountain to become the same. The people that really mean it don't put it in plain sight, they hide it.

- The *lele* on Kūkahau`ula (the summit) was put up there in 1998 and the Kahu Kū Mauna Council has been wrestling with the issue of this *lele*. It was put up by the Royal Order of Kamehameha and has symbolic meaning to them but some *kupuna* feel it should be taken down.

- There is an understanding that the *lele* was erected on the summit to physically claim Mauna Kea. That's what it took to show that Mauna Kea belongs to the Hawaiian people because of all the other buildings up there. That was the intent and was started with the Royal Order. It went up with the right intention. But, it's served its purpose. If it's being misused then by all means it should be removed. It was not put up with the intention of how people are using it today.

- People that come here – tourists or young generations - don't understand our thinking that this is culture and that's why there is such a need to destroy all those modern things that don't belong there.

- Whether or not the *lele* needs to be taken down needs to be addressed by the Kahu Kū Mauna Council – what's the protocol? When is an appropriate time to remove these things? The Rangers are faced with what to do with things left there.

- It seems to be that a lot of people who are born and raised here are trying to do the right thing – they want to do the right thing but they really don't know. There needs to be education and establishing protocols regarding offerings.

Burial Sites Access

- There is a question regarding the "No restrictions for Native Hawaiians". There's got to be a rationale for why even Hawaiians are going there. If not, this would give others the impression that they have the right just to go.

- What about the advanced notification of visits? That would make it restricted – or controlled – visits. I'm not sure how you want to manage that; other than controlled access there's really no way of telling.

- Do you really want to mention the whole idea of burial site access? It's a given to the people who know it's there. It's their own native right to do that.

- If there are people who are going to burial sites, then there needs to be some way to determine the legality of the visits. That's what we need regulations for.

- How are you identifying Native Hawaiian's access to burial sites? I think every family who has burial sites would be offended if somebody else comes there without permission.

- Another question is how many families would visit other families' burial sites?

Scattering Human Ashes

- There is a recommendation to have designated places for scattering ashes so you don't scatter on another known burial or *ahu* or somebody's shrine. Also, when you cremate not all of the bones get turned to ash so you will have bone particles and what's going to happen if you're scattering the bones/ashes where people are walking?

- OMKM or the Rangers should be notified about scattering of human ashes because if they're patrolling and they come across bone fragments, they're going to have to figure out whether it was something done legitimately or otherwise. I think again the protocol would satisfy that – no bone remains in your ashes if you scatter.

New Cultural Features

- There is a concern about the modern sites – people/tourists that go up there and take pictures of these sites are going to think that it's Hawaiian. This isn't good - they should be taken down – they have no right putting them up there anyway. They go up there without permission, why can't we go up there and take them down without permission? We have no knowledge of these people being in a normal state of mind. First and foremost, it is offending to Hawaiian people that those structures are allowed to stay up there because it's going to change the Hawaiian culture; I don't want my grandkids growing up thinking that's part of their culture. To me, they ought to be able to show their genealogy and maybe that might justify them being able to come up to Mauna Kea.

- Set protocols. Who will dismantle? The council can approve/disapprove.

Piling / Stacking Rocks

- If you're referring to repairing old, we do reconstruction on our *heiau*. This should be changed to "new" piling/stacking of rocks. So we don't get confused; this does not involve reconstruction.

- So what do we do with the hundreds of new find spots PCSI found in their surveys? Do we just leave them? What would be an appropriate thing to do? Would it make sense to say if you don't claim them by such and such date, they will be removed? In the first place, they were put up without permission but we're expecting whoever put those up there to remove it.

- I wouldn't want to be involved in dismantling anybody's shrine. If I don't know, I don't touch it. You need to get a handle on what's already there, but if it's already there, I don't know. Who's to say what's new? It is very important to have gated access; we cannot go back to know who exactly put that there but I personally will not touch those *pohaku*. I say what is there put a stop now. Now we can regulate.

- What I'm trying to say is, I don't want to be the one to determine because it was done 12 years ago that it's not the living culture of our *`ohana* because we don't know. Just because its 50 years old doesn't make it *maika`i*. Who set the 50-year guideline? What about the guy who buried his *`ohana* up there the year after and set his stone? Who are we to say that he doesn't have the right to do that? We don't know. We have to think.

6.1.9 Consultation with the Royal Order of Kamehameha

Ali`i Nui Clifford Hashimoto of the Royal Order of Kamehameha (ROK) was contacted regarding consultation for the CRMP. His response to PCSI and KCS was that the council of chiefs did not want to meet with personally at this time, but PCSI could send them information to them regarding CRMP and they would provide a written response. As of June 30, 2009, PCSI has not yet received a response from the ROK.

6.1.10 SUMMARY OF CRMP CONSULTATION WITH NATIVE HAWAIIAN ORGANIZATIONS

Consultation with the community, and specifically with native Hawaiian agencies, organizations and individuals, focused on meetings with smaller groups of individuals. Consultation was conducted with the Kahu Kū Mauna Council and the Hawaiian Culture Committee, the Royal Order of Kamehameha, Hawaiian Civic Clubs in Waimea, Kona, Hilo, and Pahala on Hawaii Island, the Office of Hawaiian Affairs (OHA), Historic Preservation Committee, and the Hawaii Island Burial Council (HIBC).

In these meetings it was explained that the CRMP identified many issues of concern, including public access, off-road vehicle use, routine maintenance, debris, enforcement, emergencies, film industry, cultural and religious practices, astronomy, recreational activities, commercial tours, commercial events, and future land use. Because of time constraints, the meetings themselves were focused on discussions of two key concerns – public access and cultural practices.

While PCSI had prepared a draft CRMP prior to consultation, it was made clear to community residents that the draft was a work in progress and needed to ultimately reflect expressed concerns from the community. Community concerns expressed regarding the currently policy of unrestricted access to Mauna Kea varied, and included the need:

1. To educate the public regarding the significance of Mauna Kea in ancient as well as contemporary Hawaiian culture
2. To establish rules regarding access
3. To establish protocols for access to sensitive archaeological and cultural sites
4. To establish a visitor registration program
5. To establish protocols for shrine and burial visitation

Community concerns expressed regarding cultural practices on Mauna Kea today are varied, and included the need:

1. To educate the visitors and local residents regarding cultural practices associated with Mauna Kea
2. To establish protocols for constructing and dismantling new rock structures
3. To establish protocols for scattering human ashes

6.2 CONSULTATION WITH OTHER STAKEHOLDERS

As discussed in Section 4 of this CRMP, PCSI consulted with Ron Koehler, the Manager of Mauna Kea Observatories Support Services (MKSS), in 2006, regarding routine maintenance activities. No activities other than those listed in Table 4-4 were identified.

PCSI also consulted with all 13 existing observatories in 2006. The consultation process consisted of a letter and follow-up phone call to the directors or their appointed staff (see Appendix E). The questions asked focused on maintenance activities of the observatories, including disposal of chemicals (see **Section 4.1.3.1**).

7.0 LIST OF PREPARERS AND CONTRIBUTORS

Holly McEldowney, Ph.D.: The "SHPD Plan" referred to throughout this CRMP was written by Holly McEldowney, whose name does not appear, however, on the title page or elsewhere in that document. Major portions of the SHPD Plan, which was appended to the 2000 Mauna Kea Science Reserve Master Plan, have been incorporated with little or no change into this CRMP. Holly's contribution to the CRMP is reflected in just how much of her plan has been used in the preparation of the current plan. She is not responsible, however, for any of the errors, omissions or other shortcomings of the CRMP.

Patrick C. McCoy, Ph.D.: The primary author of the current plan, which represents a continuation of the earlier effort by SHPD to develop a comprehensive cultural resource management plan, is Patrick McCoy. Pat, who was also involved in the earlier effort by SHPD to produce an historic preservation plan for the UH lease areas on Mauna Kea, is the Principal Investigator of the Mauna Kea Science Reserve archaeological inventory survey. He also participated in some of the community consultation meetings.

Sara Collins, Ph.D.: The section on applicable laws and regulations, as well as much of the Section 5 Implementation and Evaluation Plan, was prepared by Sara Collins. Sara also participated in the archeological inventory survey of the Science Reserve, in 2006-2009 and in some of the community consultation meetings.

Stephan D. Clark, B.S.: Steve, the Cultural Resource Manager at PCSI, participated in all of the community consultation meetings and prepared the summary of the consultation process in Section 6.

Valerie Park, M.A.: The section on cultural beliefs and practices is based in large part on a report prepared by Valerie, a PCSI archaeologist, for the Final Environmental Assessment for the Mauna Kea Comprehensive Management Plan.

Maria "Kaimi" Orr, M.A.: Maria, the Principal of Kaimi Pono Consulting Services, LLC, was the facilitator for the community consultation meetings. She also assumed the lead role in the beginning of the consultation process in selecting groups and mailing out invitations.

Denise Russell: Denise transcribed the taped recordings of the community consultation meetings. She also helped in organizing the meeting venues and obtaining refreshments for the meetings.

Mr. Richard Nees, B.A.: The tables in Appendices A and D were prepared by Rich Nees, who also edited, formatted and produced the CRMP. Rich participated in all phases of the archaeological inventory survey of the Science Reserve and was the Project Director in 2006-2009.

Mr. Andrew Tomlinson, M.A.: The maps and other figures were prepared by Andrew Tomlinson.

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APPENDIX A

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
11077	-	A-7	single upright	shrine
11079	-	A-7, A-8	lithic scatter of adze manufacturing byproducts and 2 associated cairns	“workshop” and possible shrine
16163	50-Ha-G28-38	A-6	platform/pavement with 14 uprights	shrine
16164	50-Ha-G28-40	A-6	3 to 5 uprights on platform and 1 isolated upright	shrine
16165	50-Ha-G28-41	A-6	single row of 2 uprights	shrine
16166	5224 50-Ha-G28-42	A-3	2 rows of uprights, 8 to possibly 9 total	shrine
16167	5225 50-Ha-G28-43	A-3	single row of 2 uprights	shrine
16168	5226 50-Ha-G28-44	A-1	semi-enclosure with 21 to possibly 25 uprights	shrine
16169	5227 50-Ha-G28-45	A-1	single row of 2 uprights	shrine
16170	5228 50-Ha-G28-46	A-1	2 cairns with 3 to possibly 4 uprights	shrine
16171	5229 50-Ha-G28-47	A-1	single upright	shrine
16172	5230 50-HA-G28-48	A-1, A-3	single upright	shrine
16173	5231 50-Ha-G28-49	A-3	7 dispersed uprights	shrine
16174	5232 50-Ha-G28-50	A-3	boulder with 1 to possibly 8 uprights on the side	shrine
16175	5233 50-Ha-G28-51	A-3	5 cairns with 1 upright each	shrine
16176	5234 50-Ha-G28-52	A-3	single row of 3 uprights	shrine
16177	5235 50-Ha-G28-53	A-3	platform with 3 uprights	shrine
16178	50-Ha-G28-54	A-3	single upright	shrine
16179	5237 50-Ha-G28-55	A-3	single row of 3 uprights	shrine
16180	5238 50-Ha-G28-56	A-3	boulder with 3 uprights	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
16181	5239 50-Ha-G28-57	A-3	single upright	shrine
16182	5240 50-Ha-G28-58	A-3	3 to 5 uprights	shrine
16184	5242 50-Ha-G28-60	A-3	semi-enclosure with 24 uprights	shrine
16185	5243 50-Ha-G28-61	A-3	single row of 3 uprights	shrine
16186	50-Ha-G28-67	A-3	single row of 2 and possibly 3 uprights	shrine
16187	50-Ha-G28-68	A-3	single row of 9 uprights	shrine
16188	50-Ha-G28-69	A-3	single upright	shrine
16189	50-Ha-G28-70	A-3	single row of 3 and possibly 4 uprights	shrine
16190	50-Ha-G28-71	A-3	single row of 10 uprights and off-set uprights	shrine
16191	50-Ha-G28-72	A-3	single row of 4 uprights	shrine
16192	50-Ha-G28-73	A-3	2 sets of uprights, 6 total	shrine
16193	50-Ha-G28-74	A-3, A-6	single upright	shrine
16194	50-Ha-G28-75	A-6, A-8	single row of 12-14 uprights	shrine
16195	50-Ha-G28-76	A-6	2 cairns	possible burial
16196	50-Ha-G28-77	A-6	single row of 2 uprights	shrine
16197	50-Ha-G28-78	A-6	single upright	shrine
16198	50-Ha-G28-79	A-6	2-tiered platform with 7 uprights	shrine
16199	50-Ha-G28-80	A-6	1 and possibly 4 uprights	shrine
16200	50-Ha-G28-81	A-6	single row of 5 and possibly 6 uprights	shrine
16201	50-Ha-G28-83	A-6	single row of 3 uprights	shrine
16202	50-Ha-G28-84	A-6	single upright	shrine
16203	50-Ha-G28-86	A-6	single row of 2 and possibly 3 uprights and a lithic scatter of adze manufacturing byproducts	adze “workshop” and shrine
16204	50-Ha-G28-1	A-7	5 shrines, 26 stone-walled enclosures and a lithic scatter of adze manufacturing byproducts	probable rites of passage site for apprentice adze makers
16248	-	A-4	series of cairns	burial
18682	50-Ha-G28-82	A-6	single row of 3 uprights	shrine
18683	50-Ha-G28-83	A-6	single row of 2 uprights	shrine
21197	-	A-6	2 platforms with a total of 5 uprights	shrine
21198	-	A-6	single upright	shrine
21199	-	A-3	single upright	shrine
21200	-	A-3	single upright	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
21201	-	A-3	single row of 2 uprights	shrine
21202	-	A-3	single row of 6 to possibly 7 uprights	shrine
21203	-	A-3	single row of 2 uprights	shrine
21204	-	A-3	3 areas of stacked rock	indeterminate
21205	-	A-3	single upright	shrine
21206	-	A-3, A-8	single upright	shrine
21207	-	A-3, A-8	single upright	shrine
21208	-	A-6	1 to 2 uprights on a boulder	shrine
21209	-	A-6	cairn on summit	possible shrine
21210	-	A-7, A-8	single upright	shrine
21211	-	A-7, A-8	single row of 2 uprights on a platform and a lithic scatter of adze manufacturing byproducts	adze “workshop” and shrine
21212	-	A-6, A-8	single row of 2 uprights	shrine
21213	-	A-7, A-8	3 piles of rocks with 1 possible upright	possible shrine
21214	-	A-7, A-8	single row of 5 and possibly 7 uprights	shrine
21406	-	A-5	single upright	shrine
21407	-	A-5	single row of 2 uprights	shrine
21408	-	A-5	single upright	shrine
21409	-	A-5	single upright	shrine
21410	-	A-5	single row of 5 uprights	shrine
21411	-	A-5	cairn	possible marker
21412	-	A-1, A-5	cairn	possible marker
21413	-	A-1	cairn	possible burial
21414	-	A-1	cairn	possible burial
21415	-	A-1	cairn on a boulder	indeterminate
21416	-	A-1	cairn	possible burial
21417	-	A-3	cairn	indeterminate
21418	-	A-3	3 and possibly 4 uprights on top and to the side of a boulder	shrine
21419	-	A-2	single upright	shrine
21420	-	A-2	enclosure with 11 and possibly 12 uprights and a nearby stone platform	shrine
21421	-	A-2	2 cairns, one with a possible upright and an isolated upright	possible shrine
21422	-	A-3	single upright	shrine
21423	-	A-2	cobbles on boulder	possible marker

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
21424	-	A-2	4 to 5 uprights on a platform and boulder	shrine
21425	-	A-2	single upright	shrine
21426	-	A-2	single row of 4 uprights	shrine
21427	-	A-2, A-3	terrace with possible upright	indeterminate
21428	-	A-2	single upright	shrine
21429	-	A-2	single upright	shrine
21430	-	A-6	single row of 3 uprights	shrine
21431	-	A-6, A-8	semi-enclosure with 7 to 10 uprights	shrine
21432	-	A-3, A-6, A-8	single row of 2 uprights	shrine
21433	-	A-3, A-4	single upright	shrine
21434	-	A-3, A-4	8 stones on a boulder	indeterminate
21435	-	A-3, A-4, A-8	cairn and boulder with single upright	shrine
21436	-	A-5	cairn	shrine
21437	-	A-5	lithic scatter of adze manufacturing byproducts	adze workshop
21438	-	-	Kukahauula (summit)	TCP
21439	-	-	Pu`u Lilinoe	TCP
21441	-	A-1	3 features with 12 uprights	shrine
21442	-	A-1	single upright	shrine
21443	-	A-1	single upright	shrine
21444	-	A-1	single upright	shrine
21445	-	A-1	3 dispersed uprights	shrine
21446	-	A-3	single row of 9 uprights, plus two additional uprights	shrine
21447	-	A-3	single upright	shrine
21448	-	A-2, A-3	two uprights	shrine
21449	-	A-3	terrace	unknown
21550	-	A-3	3 cairns	historic survey markers
21551	-	A-6	single upright	shrine
21552	-	A-7	platform	probable human burial
25760	-	A-7, A-8	lithic scatter of adze manufacturing byproducts	adze workshop
25761	-	A-7, A-8	lithic scatter of adze manufacturing byproducts	adze workshop
25762	-	A-7, A-8	lithic scatter of adze manufacturing byproducts and enclosures	adze workshop and shelters
25763	-	A-8	single upright on boulder	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
25764	-	A-7, A-8	5-8 uprights on mound	shrine
25765	-	A-7, A-8	platform	possible burial
25766	-	A-7, A-8	4 mounds	unknown
25767	-	A-7	2 adze preforms	isolate artifacts
25768	-	A-7, A-8	basalt flake	isolate artifacts
25769	-	A-7, A-8	lithic scatter	adze manufacturing
25770	-	A-7, A-8	lithic scatter and rock pile	adze manufacturing; possible burial
25771	-	A-8	single upright in soil	shrine or burial
25772	-	A-8	3 uprights, single upright on boulder, a mound, and lithic scatter of adze manufacturing byproducts	shrines, adze workshop, and markers
25773	-	A-8	single upright on boulder	shrine
25774	-	A-8	4 pavements/low mounds	unknown
25775	-	A-8	1-2 uprights on boulder	shrine
25776	-	A-8	cairn, enclosures, lithic scatter of adze manufacturing byproducts, and 2 possible fallen uprights	shrine, adze workshop, and shelter
25777	-	A-8	mound	marker
25778	-	A-8	1-2 uprights on boulder	shrine
25779	-	A-8	lithic scatter of adze manufacturing byproducts, 3 preforms, and hammerstone	adze workshop
25780	-	A-8	single upright on mound	shrine
25781	-	A-8	3-4 uprights, walled overhang, and lithics	shrine, shelter, and adze manufacturing
25782	-	A-8	single upright, lithic scatter of adze manufacturing byproducts, and 2 enclosures	shrine, adze workshop, and shelter
25783	-	A-8	1 and possible 2 pairs of uprights	shrine
25784	-	A-6, A-8	single upright in bedrock crack	shrine
25785	-	A-8	rock pile	marker
25786	-	A-8	1-3 uprights on bedrock surface	shrine
25787	-	A-8	3-4 uprights in bedrock crack	shrine
25788	-	A-8	possible upright	possible shrine
25789	-	A-6	17-20 uprights on bedrock surface and lithic scatter	shrine and offering
25790	-	A-6	2-6 uprights on mound	shrine
25791	-	A-4, A-8	single upright on boulder	shrine
25792	-	A-4, A-8	rock pile with slabs	shrine
25793	-	A-3	4 uprights on bedrock surface	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
25794	-	A-3	single upright in bedrock crack	shrine
25795	-	A-3	single upright on boulder	shrine
25796	-	A-3	lithic scatter of adze manufacturing byproducts and preforms	adze workshop
25797	-	A-3, A-4	single upright on boulder	shrine
25798	-	A-3, A-4	single upright on boulder	shrine
25799	-	A-3, A-4	single upright, terrace, pavement, possible boulder shrine	shrine complex
25800	-	A-3, A-4	horseshoe	historic artifact
25801	-	A-4	lithic scatter of adze manufacturing byproducts	adze workshop
25802	-	A-4	terrace and mound	burials
25803	-	A-4	mound	possible burial
25804	-	A-4	mound	possible burial
25805	-	A-4	mound	possible burial
25806	-	A-4	3 rock piles/mounds	possible burials
25807	-	A-4	3 mounds	burial
25808	-	A-4	human remains and terraces	burials
25809	-	A-4	exposed human remains	burials
25810	-	A-4	4 rock mounds	shrine and markers
25811	-	A-4	possible upright	possible shrine
25812	-	A-4	overhang and crude wall	possible burial
25813	-	A-4	mound with possible uprights (2)	possible shrine
25814	-	A-4	3 mounds on cinder cone	possible burials
25815	-	A-4	mound	possible burial
25816	-	A-4	mound	possible burial
25817	-	A-4	2 enclosed areas	shelter
25818	-	A-4	terrace with 5-7 uprights	shrine
25819	-	A-2, A-4	two groups of uprights (15-16 uprights)	shrine
25820	-	A-2, A-4	3 uprights on mound	shrine
25821	-	A-2, A-4	single upright on boulder	shrine
25822	-	A-2, A-4	terrace with 6-9 uprights	shrine
25823	-	A-2, A-4	mound	possible burial
25824	-	A-2, A-4	mound	possible burial
25825	-	A-2, A-4	2-3 uprights on mound	shrine
25826	-	A-3	2 uprights on bedrock	shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
25827	-	A-3	2-4 uprights on bedrock	shrine
25828	-	A-3	lithic scatter of adze manufacturing byproducts	adze workshop
25829	-	A-1	mound	possible burial
25830	-	A-1	platform	possible burial
25831	-	A-1	mound	possible burial
25832	-	A-1	mound	possible burial
26217	-	A-3	3 uprights on mound	shrine
26218	-	A-2	piled cobbles, alignments, historic trash	USGS camp site
26219	-	A-2	1-2 uprights on mound	shrine
26220	-	A-2	C-shapes	temporary shelters?
26221	-	A-2	single upright on bedrock	shrine
26222	-	A-2	1-2 uprights on mound	shrine
26223	-	A-2	single upright	shrine
26224	-	A-2	3 uprights on bedrock	shrine
26225	-	A-2	single upright on boulder	shrine
26226	-	A-3	mound	possible shrine
26227	-	A-3	single upright on mound and lava tube	shrine and possible shelter
26228	-	A-3	6-12 uprights on mound	shrine
26229	-	A-2	1-2 uprights on boulder	shrine
26230	-	A-2	mound	unknown
26231	-	A-2	2 uprights on mound	shrine
26232	-	A-2	rock wall and find spot	temporary shelter and marker
26233	-	A-1, A-2	6-12 uprights on horseshoe-shaped enclosure	shrine
26234	-	A-1, A-2, A-3	single upright	shrine
26235	-	A-1	single upright	shrine
26236	-	A-1	single upright	shrine
26237	-	A-1	mound	possible burial
26238	-	A-1	single upright on boulder	shrine
26239	-	A-1	single upright on boulder	shrine
26240	-	A-1	4-5 uprights on mound and single upright in overhang	shrines
26241	-	A-1	mound	unfinished shrine
26242	-	A-1, A-5	cairns	marker and shrine

LIST OF HISTORIC PROPERTIES LOCATED IN THE MAUNA KEA SCIENCE RESERVE

State Site No. 50-10-23-	Additional State Numbers or BPBM Site Number	Report Map Number	Brief Description	Functional Type
26243	-	A-1, A-5	single upright	shrine
26244	-	A-1, A-5	single upright	shrine
26245	-	A-1, A-5	cairn	marker
26246	-	A-1, A-5	cairn	marker
26247	-	A-1, A-5	cairn	marker
26248	-	A-5	3-4 uprights on bedrock	shrine
26249	-	A-5	lithic scatter of adze manufacturing byproducts	adze workshop
26250	-	A-5	1-3 uprights on mound, single upright on bedrock, and historic trash	shrines and dump
26251	-	A-5	single upright	shrine
26252	-	A-5	2 uprights on bedrock	shrine
26253	-	A-5	Complex consisting of multiple uprights, multiple lithic scatters of adze manufacturing byproducts, and quarried area for adze manufacturing	shrines, adze workshops, and quarrying areas
26254	-	A-5	3 uprights on mound and cairns	shrines and markers?
26255	-	A-5	single boulder	shrine
26256	-	A-5	cairn	marker

APPENDIX B

SHPD REVIEW LETTER ON PROPOSED W.M. KECK OUTRIGGER PROJECT

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

May 3, 1999

Dr. Robert A. McLaren, Interim Director
Institute for Astronomy
University of Hawaii at Manoa
2680 Woodlawn Drive
Honolulu, Hawaii 96822

LOG NO: 23155
DOC NO: 9903PM07

Dear Dr. McLaren:

SUBJECT: Request for Historic Preservation (Chapter 6E, HRS) and National Historic Preservation Act (Section 106) Review --W.M. Keck Observatory Outrigger Telescope Project in the Mauna Kea Science Reserve, Ka`ohe, Hamakua, Hawaii Island TMK: 4-4-15:09

Thank you for your letter of March 17, 1999 and the opportunity to review and comment on the Draft Environmental Assessment (DEA) prepared for the proposal to add four to six 1.8-meter "outrigger" telescopes around the two existing 10-meter Keck telescopes located on Pu`u Hau Oki.

Before discussing our review of the DEA, two aspects of the review process need clarification. First, the DEA and your letter correctly indicate that the project needs to comply with Section 106 of the National Historic Preservation Act (NHPA) because federal funds are being used for the project. Your letter, however, asks that we coordinate our review with the Advisory Council on Historic Preservation (ACHP). According to the Section 106 regulations, it is technically the responsibility of the federal agency, in this case NASA, to determine the effect of a project on historic properties and to consult with the State Historic Preservation Office on its determination. The agency may designate another party, such as IFA, to execute its responsibility. We suggest that you or NASA review our comments on the DEA and, if you agree, submit the recommended determination to our office for our official comment. We would be glad to provide you with any information you need on the Section 106 process. Second, your letter asks us to review the finding of "no significant impact" proposed by the DEA. We do not review determinations of this sort because, if we understand correctly, this assessment considers a combination of factors, issues, and subject matters that are beyond our expertise and jurisdiction. Our assessment of effect in the following discussion conforms with our standard review process and we ask that it be incorporated in the final Environmental Assessment.

The DEA proposes that IFA will be requesting a "no effect" determination for the construction of the outrigger observatories when applying for the appropriate permits. To support this finding, the DEA cites past studies and a compliance letter to argue that no historic properties are present in the project area. It notes that no cultural remains were found on Pu`u Hau Oki in a 1982 reconnaissance survey of the summit cones[1] and no sub-surface remains were reported during the construction of the Keck I or Keck II observatories. It concludes that Pu`u Hau Oki appears to be of no particular cultural significance because ethnographic information compiled in conjunction with the 1982 survey did not attribute any particular significance to the *pu`u.*[2] Finally, the DEA cites a "no effect" assessment received from the State Historic Preservation Office (SHPO) for the establishment of optical test sites on Pu`u Hau Oki (Ltr. Wilson to McLaren, June 30, 1998).

As a point of clarification, the first archaeological reconnaissance of Pu`u Hau Oki actually took place in 1981 when a portion of the cinder cone was surveyed as one of the five alternative locations for the proposed Kitt Peak National Observatory data collecting facilities (Ltr. McCoy to Jeffries, June 9, 1981). A third reconnaissance survey of another part of Pu`u Hau Oki was undertaken in 1990 when the 5.1 acre Subaru Observatory site was surveyed[3]. No archaeological sites were found in either of these surveys.

As you are aware, we are currently reviewing historical, ethnographic, and archaeological information on Mauna Kea in the process of preparing an historic preservation plan for the Science Reserve which includes the summit region. During this process, we have come to believe that the cluster of cinder cones which merge and collectively form the summit of Mauna Kea is an historic property and that this single landscape feature probably bore the name Kukahau`ula. This single landscape feature is now called Pu`u Hau Oki, Pu`u Kea, and Pu`u Wekiu. Several lines of evidence lead us to the conclusion that the cluster of cones is an historic property. These will be discussed in more detail in documents being prepared for the preservation plan. The first line of evidence indicating the cultural and historical importance of the summit is that, at a minimum, some portion of the summit cluster bore the name Kukahau`ula who appears as a character in recorded Hawaiian traditions and as a figure in legends about Mauna Kea[4]. As a character in traditional histories and genealogies, he is the husband of Lilinoe and is named as an *`aumakua* (family deity) of fishermen. A descendant, Pae, was known as an exceptional fisherman whose bones were coveted for fishhooks by the paramount chief Umi. In one legend, Kukahau`ula is cast in a more fanciful role as the suitor and husband of Poliahu, the deity of snow and, poetically, his name is said to allude to the pink hue that can be seen reflecting from the snow-covered summit. Lilinoe plays a similar role in the mountain's traditions in that she appears both as a traditional character and a mythical

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[1] McCoy, P. "Archaeological Reconnaissance Survey." In *Cultural Resources Reconnaissance of the Mauna Kea Summit Region.* Manuscript, Anthropology Department, Bernice P. Bishop Museum, 1982.

[2] McEldowney, H. "Ethnographic Reconnaissance Survey" In *Cultural Resources Reconnaissance of the Mauna Kea Summit Region.* Manuscript, Anthropology Department, Bernice P. Bishop Museum, 1982.

[3] Robbins, J. and H Hammatt. Archaeological Reconnaissance for the Proposed Japanese National Large Telescope, Maunakea, Hawaii. Manuscript prepared by Cultural Surveys Hawaii for MCM Planning, 1990.

[4] Kamakau, S.M. *Ruling Chiefs of Hawaii.* Honolulu: Kamehameha School Press, 1961:215-17. Poepoe, J.M. "Kamehameha I, Ka Nai Aupuni o Hawaii, K Liona o ka Moana Pakipika." *Ka Nai Aupuni,* 1906:April 30. Poepoe, J.M. Bishop Museum Genealogy Book 13:20, B.P. Bishop Museum Library. Taylor, E.A. "Ku-Kahau-ula and Poliahu" *Paradise of the Pacific,* Vol. 44(7):12-15, 1931.

figure[5]. She is, however, even more frequently associated with the summit region of Mauna Kea. In addition to being the wife of Kukahau`ula in some traditions, she is said to have been buried near the summit and is called the "woman of the mountain." One tradition has her being an ancestor of the illustrious Mahi family who served as warriors and attendants to the paramount *ali`i* of Hawaii Island. In legends, Lilinoe becomes the embodiment of fine mist, the literal meaning of her name, and as such is the companion or sister of Poliahu.

The names Kukahau`ula and Lilinoe are both attributed to cinder cones in the summit region: Kukahau`ula to the summit and Lilinoe to a cone immediately to the southeast of the summit cluster. These names, along with that of Waiau, appear on the earliest reliable map in 1884 and are repeated in the next survey of the summit region in 1891 and 1892[6]. Kukahau`ula is given as the name of "the highest peak" even earlier in 1873 land boundary testimonies[7]. Of all the place names in the summit region, these three are applied the earliest and most consistently to specific landmarks on the mountain. In compiling the 1892 map of Mauna Kea, W.D. Alexander refers to these as "genuine native names[8]." The place name Poliahu appears in traditions and native testimonies as being applied to a trail, spring, pond, and cave[9], but it is not consistently applied to a single and identifiable landscape feature until 1892 when W.D. Alexander proposes attaching this name to "a nameless peak" in honor of the demigoddes, Poliahu, who figures in the tale of Laieikawai[10].

While the association between the summit and Kukahau`ula is sufficiently clear, it is not as clear which specific topographic features at the summit are encompassed by the name. The conclusion drawn here that Kukahau`ula, and thus its association with a significant individual and character, probably applied to the entire summit cluster relies on four major arguments. First, use of the name Pu`u o Kukahau`ula in the boundary testimonies and in subsequent

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[5] Kamakau, S.M. *Ruling Chiefs of Hawaii.* Honolulu: Kamehameha School Press, 1961:215-17, 285. Poepoe, J.M. "Kamehameha I, Ka Nai Aupuni o Hawaii, Ka Liona o ka Moana Pakipika." *Ka Nai Aupuni,* 1906:April 30. Poepoe, J.M. Bishop Museum Genealogy Book 13, page 20, B.P. Bishop Museum Library. Haleole, S.N. "The Hawaiian Romance of Laieikawai.". In *33rd Annual Report of the Bureau of American Ethnology,* Edited by M.W. Beckwith, (1919):480. Taylor, E.A. "Ku-Kahau-ula and Poliahu" *Paradise of the Pacific,* Vol. 44(7):12-15, 1931 Fornander, A. *Fornander Collection of Hawaiian Antiquities and Folk-lore.* Translated and edited by T.G. Thrum. Memoirs of the Bernice P. Bishop Museum, 1919:269. Westervelt, W.D *Legends of Gods and Ghosts.* Boston: H. Ellis, 1915:56.

[6] Lyons, C.J. "North Side of Mauna Kea, Information Sketch." Register Map 1210, Survey Office, State of Hawaii, 1884 to 1891. Lyons, C.J. "Kaohe and Humuula, Hawaii." Register Map 1891, Survey Office, State of Hawaii, 1891. Alexander, W.D. "Summit Peaks of Mauna Kea." Register Map 1860, Survey Office, State of Hawaii, 1892. Baldwin, E.D. Field Book 323:55, Survey Office, State of Hawaii, 1891.

[7] Boundary Commission Books for Hawaii, Microfilm in Archives of Hawaii, Vol. B:35.

[8] Preston, E.D. "Determination of Latitude, Gravity, and the Magnetic Elements at Stations in the Hawaiian Islands, Including a Result for the Mean Density of the Earth, 1891, 1892. In *Report of the Superintendent of the U.S. Coast and Geodetic Survey for the Fiscal Year Ending June 30, 1893, Part II.* Washington: Government Printing Office, 1895:596.

[9] Kamakau, S.M. *Ruling Chiefs of Hawaii.* Honolulu: Kamehameha School Press, 1961:16. Poepoe, J.M. "Kamehameha I, Ka Nai Aupuni o Hawaii, Ka Liona o ka Moana Pakipika." *Ka Nai Aupuni,* 1906:April 30. Boundary Commission Books for Hawaii, Microfilm in Archives of Hawaii, Vol. B:40, 1873.

[10] Preston, E.D. "Determination of Latitude, Gravity, and the Magnetic Elements at Stations in the Hawaiian Islands, Including a Result for the Mean Density of the Earth, 1891, 1892. In *Report of the Superintendent of the U.S. Coast and Geodetic Survey for the Fiscal Year Ending June 30, 1893, Part II.* Washington: Government Printing Office, 1895:596.

notes of field surveys[11] indicates that the name was applied, at a minimum, to the cinder cone (i.e., *pu`u*) as a whole and not just to the highest peak or what would generally be considered the summit in English usage. Second, on the early survey maps (i.e., 1884 to 1891 and 1891), the name Kukahau`ula is written to the east of the cluster of cones and is not immediately associated with a particular point. In contrast, the highest point on the mountain on these maps is labeled the "summit" and "summit cone" and the triangulation marker on the northeastern peak of the cluster is labeled "Mauna Kea."

The third argument is that place names attributed to the summit cluster are relatively modern because these cones were not differentiated by name until after the 1920s. The name Pu`u Kea, the northeastern part of cluster, first appears in 1937 when commemorative names, such as Macrae, Douglas and Goodrich, were given to other unnamed cones. The names Pu`u Wekiu for the southernmost cone in the cluster and Pu`u Hau Oki for the westernmost cone were recorded by Forester L.W. Bryan in the 1920s and were officially adopted by the Advisory Committee on Geographic Names in 1974[12]. Another factor suggesting the relatively modern origin of these three names is that all are highly descriptive in nature, particularly in contrast to those older names which tend to be associated with traditional or legendary characters. Pu`u Hau`Oki literally means "frosty peak," Pu`u Kea means "white peak," and Pu`u Wekiu means "summit peak." Finally, from most angles of approach, these three named cones or peaks have the appearance of a single, although uneven and complex, landscape feature. It is only after a more thorough examination of this feature that one, if so inclined, would begin to differentiate particular cinder slopes with their associated crater features. Most early historic accounts of visits to the summit essentially describe the summit as a single feature with some parts being higher than others. This is also reflected in the early survey maps which, through hatch marks, depict the cluster of cones as a single unit. At this time, it can not be known with certainty how Hawaiians during the early historic period and their predecessors would have viewed the cluster or what purposes they may have had to make and name particular distinctions within the cluster. Given the unified appearance of the cluster and the prominence of the name Kukahau`ula, however, it seems reasonable, if not probable, that this name applied to this entire landscape feature, including that which is now called Pu`u Hau Oki.

Another line of evidence indicating the summit cluster was of particular and singular significance can be drawn from the archaeological data. The distribution of known shrine locations essentially radiates, at various distances, outward from the base of the summit cluster. This suggests that the summit cluster could have been the central focus of ritual observances and that part of these observances was to avoid or stop short of this central feature. This is further supported by there being no records, with one possible exception (i.e., a 1935 photograph of a slab and stone mound at the summit peak[13]), of shrines on the summit cluster. The practice of avoiding or staying outside that area of greatest significance is common in many religious observances recorded throughout the world. Thus the summit cluster could have been a focal point of the presumably long journey to the summit region. Avoidance of the summit, or the summit region as a whole, for fear of the spiritual nature of

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[11] Boundary Commission Books for Hawaii, Microfilm in Archives of Hawaii, Vol. B:35, 1873. Baldwin, E.D. Field Book 323:55, Survey Office, State of Hawaii, 1891.

[12] Bryan, L.W. Letter to Libert K. Landgraf, December 31, 1973, Department of Planning and Economic Development. Mark, Shelley. Memorandum to Members of Advisory Council on Geographic Names, March 13, 1974, Department of Planning and Economic Development.

[13] Bryan, E.H. *Mauna Kea Here We Come: The Inside Story of an Scientific Expedition.* Honolulu: Privately Published, 1979:35.

this area may be one explanation for the number of times native Hawaiian guides refused or found excuses not to accompany early historic visitors to the summit. In discussing his tour of Hawaii Island in 1823, missionary William Ellis noted that he was told "numerous fabulous tales relative to its [Mauna Kea] being the abode of the gods, and none ever approach its summit..."[14]

Given our conclusion that Pu`u Hau Oki is part of an historic property, we believe the proposed construction of four to six outrigger telescopes on the site of the W.M. Keck Observatory will have an "adverse effect" both on this historic property and on the summit region which we believe is eligible for inclusion in the National Register as an historic district. In the historic preservation plan we will also be proposing that the summit region of Mauna Kea is eligible for inclusion in the National Register of Historic Places as an historic district because it encompasses a sufficient concentration of historic properties (i.e., shrines, burials and culturally significant landscape features) that are historically, culturally, and visually linked within the context of their setting and environment. Tentatively the boundaries of this district will coincide with the extent of the glacial moraines and the crest of the relatively pronounced change in slope that creates the impression of a summit plateau surrounding the cinder cones at or near the summit (i.e., generally the area above the 11,600 to 12,000 foot contour). The cluster of cones forming the summit, including Pu`u Hau Oki, would be a contributing property to this district. We believe, however, that these "adverse effects" can be mitigated if appropriate measures are adopted. To be in compliance with the Section 106 regulations, these mitigation measures need to be stipulated in a signed Memorandum of Agreement (MOA). The MOA should also address those activities occurring at the stockpiling area which could affect, indirectly, the surrounding areas which are also part of the historic district.

The MOA should be relatively easy to prepare as the DEA has already proposed many of the measures we would find appropriate, including those to be executed during the construction phases and those designated as long-range plans. Descriptions of these measures would need to be slightly reworded to explain how these actions would specifically curtail any further degradation of the summit *pu`u* or the historic district. For example, appropriate measures would include those proposed to stabilize the cinder cone slopes, control the accidental dispersal of debris during and after construction, determine the disposition of excavated material which cannot be reused on site, minimize the visibility of the outrigger observatories within the summit region as well as from a distance, and reduce noise during construction and operation of the observatories. In the case of Puu Hau Oki, mitigation should focus on measures that would prevent or minimize those actions that would further deteriorate the structural and visual integrity (i.e., shape and contour) of the cinder cone and its crater.

The history of the project site given on page VI-1 indicates that 34 feet of earth was removed from the top of the site during the construction of the Keck I telescope. We would concur that this alteration effectively precludes the presence of burials. What isn't clear is the exact history of the 71,700 square feet, apparently the site of Keck II, which was left "in its natural state." The description says that this area was leveled during the construction of Keck II. The process of leveling this area or covering it with excavated material from the Keck I site would not necessarily preclude the possibility of burials because they could lie at moderate depths below the natural surface. The specific history of the northern part of the project area should be clarified and, if ground surfaces still exist that were only superficially altered, then we feel

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[14] Ellis, W. *Journal of William Ellis.* 1827 London ed. and 1917 Hawaii ed. Reprint, Honolulu: Advertiser Publishing, 1963:292.

some provision for dealing with potential burials. These should be included in the MOA for the proposed excavation of the light pipes, junction boxes and tunnels. In the historic preservation plan we are currently preparing, we will be asking that any excavation taking place on the summit cones be subject to testing and/or monitoring. This measure would address the persistent claim that burials were previously disturbed during construction of an observatory and the fact that known and suspected burials are present on other cinder cones in the summit region. Exceptions would be those areas that have been previously altered to such an extent that this degree of alteration would preclude the possibility of remaining burials.

To be in compliance with the 1992 amendments of the NHPA, the federal agency or its designee needs to consult with native Hawaiian organizations on undertakings that could have a potential effect on historic properties which are of religious and cultural significance to them. We suggest that you consider contacting those native Hawaiian groups and individuals who have been identified as having a particular interest in Mauna Kea during preparation of the new Mauna Kea Master Plan.

On another matter, concerns have been raised that this assessment and the pending permit applications may be approved and construction begin before the new Mauna Kea Master Plan has been completed and adopted. We agree it would be preferable to complete the application process after the new Master Plan has been adopted. While we feel there is sufficient information to assess the effects of this project on historic properties, it would be preferable to know that the final decisions were made within the context of the new, long-term development and management plan for the summit region.

Our detailed comments on the DEA can be found in Attachment 1. If you should have any questions about our review comments please contact either Patrick McCoy (692-8029) or Holly McEldowney (692-8028).

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:amk

Attachment 1
Detailed Comments on W.M. Keck Observatory Outrigger Telescope Project in the Mauna Kea Science Reserve

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Page S-3, para. 7. A number of the mitigation measures proposed to minimize impacts on the arthropod fauna are also applicable to historic preservation concerns. These should be included in the MOA.

Page S-4, para. 2. The term "historic properties" or "historic sites" should be used instead of "cultural remains" to describe the results of the 1982 archaeological survey of the summit area. This more specifically indicates that the survey was to identify archaeological surface features.

Page S-4, para. 3. This paragraph describes the recent survey work done by our office in 1995 and 1997. As written, this paragraph gives the somewhat misleading impression that this recent work to relocate and assess the condition of sites found in 1982 and 1984 took place near areas where telescopes were being constructed. While it is true that none appear to have been disturbed directly by construction activities, almost all are at quite a distance from existing telescopes. Also we would not refer to the 1995 work as "a full reconnaissance survey." It was simply a survey to relocate and assess previously identified historic properties. It should also be mentioned that the sites being assessed are mostly shrines.

Page S-4, para. 5. Some of the commitments made here to reduce the visual impacts of the observatories and associated infrastructure would be appropriate in the MOA. For example, constructing retaining walls to maintain the structure of the cinder cone and its slopes is a mitigation measure that would help maintain the integrity of this historic property. Constructing the retaining walls of natural-colored materials so that they blend with the existing terrain is another appropriate mitigation measure.

Page S-7, Table S-1 and Page II-15, Table 2-1. In this summary table, Section 106 of the National Historic Preservation Act and the accompanying regulations should be listed under federal compliance and not the state or Board of Land and Natural Resources. The State Historic Preservation Office only plays a role in the Section 106 process, it does not implement the process. This law, like that of NEPA, is triggered in this case by the expenditure of federal funds on the project. Chapter 6E.8 is triggered by the project taking place on state land and the involvement of a state agency.

Pages II-11 and II-13 and Page IV-8. These discussions make numerous commitments that would be appropriate in the MOA. The commitment is made to prevent the accidental dispersal of debris from construction and storage sites (Page II-13, para. 9), but the discussion does not address who is responsible for collecting debris and materials that are dispersed despite the best of intentions. Contingency plans for clean-up should be included. Also, the discussion mentions monitoring by the Mauna Kea Support Services and that additional recommendations by the consulting entomologist will be in the construction contract. Additional recommendations may also result from consultations with the native Hawaiian community.

Page III-9, paras. 3 and 4. This "Cultural Resources" section does not really depict the nature and distribution of known historic properties in the summit region or in these areas closest to the proposed project area. We suggest that this section be revised so that the results of the 1982 and 1984 surveys are better represented in the opening paragraph. It should be made clear that the 40 sites identified during those surveys are almost certainly religious shrines and that these surveys were limited geographically. While it is true that pre-construction surveys have not found historic sites in the summit area, some were found during the survey conducted for the VLBA Antenna. The sentence that "No additional sites were located" is also misleading because the more recent surveys have identified a substantial number of addition shrines in the summit region. Although the reports of these surveys have not been completed, a draft report on site characteristics and distribution patterns was submitted to IFA in February 1999. At a minimum these greater numbers should be mentioned. As we mentioned in an earlier comment (Page S-4, para. 3), our field work in 1995 had other objectives and it is somewhat misleading to say these sites were not damaged by telescope construction when the historic sites are located a considerable distances from the observatories. We are also puzzled by the description of the geological attributes of the Mauna Kea Ice Age Reserve in the "Cultural Resources" section. The adze quarry is appropriate in this discussion but it should also be mentioned after the distribution of known shrines.

Page IV-1, para. 5 and Page IV-2, paras. 1 and 2. As discussed in our cover letter, this history of the project area should be clarified as it is not clear if the 71,700 square feet used for the Keck II Observatory has been substantially or only moderately altered.

Page IV-3, para. 5. The potential need to stabilize the cinder cone and its slopes should be addressed in the MOA as should a commitment to maintain the general shape and form of the cone in a manner that blends with the terrain.

Page IV-3, paras. 7 and 8. The issue of drainage and erosion should be addressed in the MOA because the formation of gullies on the cone slopes would affect the integrity of the historic property. While the mitigation proposed may alleviate the problem, the MOA should probably include a provision for the long-term monitoring of their effectiveness in case unforeseen erosion occurs.

Page IV-8 and IV-9, Historical and Cultural Resources. Our comments on this section are similar to those expressed earlier (Page S-4, para. 3; Page III-9, paras. 3 and 4). We feel the known distribution of shrines in the summit region should be given greater prominence than the adze quarry in this context. It should be explicitly stated that the forty known sites are most likely religious shrines. As we have argued in our cover letter, our assessment of historic properties in the project area and the potential effects of the project is substantially different from that which is stated here.

Page IV-9 and IV-10, Aesthetics. A number of the identified issues in this section and proposed mitigation measures should be included in the MOA. This includes potential affects during the construction period and those that are long-range.

University of Hawaii at Manoa

Institute for Astronomy
2680 Woodlawn Drive • Honolulu, Hawaii 96822
Telex: 723-8459 • UHAST HR

Office of the Director

January 4, 2000

Dr. Don Hibbard, Administrator
Department of Land and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokula Blvd.
Kapolei, HI 96707

Dear Dr. Hibbard:

Subject: Request for Historic Preservation (Chapter 6E, HRS) and National Historic Preservation Act (Section 106) Review — W. M. Keck Observatory Outrigger Telescope Project, Mauna Kea, Hamakua, Hawai'i (TMK 4-4-15:09)

Thank you for reviewing our request and also for providing us with new information concerning the cultural significance of the Mauna Kea summit. We will include all of the new information and your assessment of effects in the Final EA. We also appreciate you assistance in navigating through the NHPA Section 106 consultation process and suggesting mitigating measures that would prevent or minimize those actions that would further deteriorate the structural and visual integrity (i.e., shape and contour) of the cinder cone and its crater.

NASA has authorized the University of Hawai'i Institute for Astronomy (UH IfA) to initiate and conduct working level consultations and negotiations to meet the requirements of Section 106 as implemented by the Advisory Council on Historic Preservation (ACHP) regulations at 36 CFR Part 800, "Protection of Historic and Cultural Properties." However, NASA will make all formal findings, such as a finding that historic properties are affected. In the event that a memorandum of agreement (MOA) with the State Historic Preservation Officer and, if appropriate, the ACHP is necessary, the UH IfA is authorized to negotiate the terms, conditions, and stipulations of the MOA on NASA's behalf. However, NASA will be the signatory of the MOA with the SHPO and, if appropriate, the ACHP. UH IfA will sign as a concurring party.

In regard to the history of the project site given on page VI-1, review of all of the past grading plans for the WMKO site indicates that the entire area to be used for the Outriggers has been previously graded, cut and altered to an extent that precludes the presence of burials. To alleviate

concerns, however, and to prevent the highly unlikely inadvertent disturbance of remains, an archaeologist will be retained to monitor all excavations during the construction period.

In regard to your concern about the Master Plan update process, the proposed project is explicitly included as one component of the astronomy development proposed in the new Master Plan. The new plan, which is programmatic, and intended to cover the next 20 years, will be presented to the UH Board of Regents in the near future. We understand that the CDUA for the project will not be presented for approval to the Land Board until the updated Master Plan is adopted by the Board of Regents. In addition, we do not plan to file the Final EA/FONSI until the Section 106 consultation process has been completed.

The Keck Interferometer/Outrigger Project is a key element within the National Aeronautics and Space Administration (NASA) Origins program. As it is part of a larger endeavor, its schedule is critical to the overall success of the program. For this reason, and the fact that it would be constructed on a currently developed site and cause minimal disturbance to the environment, UH decided to allow the environmental review and permitting activities to proceed in parallel with the Master Plan process. Relevant recommendations from the Master Plan will be incorporated into the design and construction plans.

In response to your detailed comments on the EA:

Page S-3, para. 7. A number of the mitigation measures proposed to minimize impacts on the arthropod fauna are also applicable to Historic Preservation concerns, These should be included in the MOA.

Response: We will do so. In addition, we are working with an entomologist to identify other mitigating measures. These will also be included in the MOA if they are applicable to Historic Preservation.

Page 8-4, para. 2. The term "historic properties" or "historic sites" should be used instead of "cultural remains" to describe the results of the 1982 archaeological survey of the summit area. This more specifically indicates that the survey was to identify archaeological surface features.

Response: We will make the appropriate changes in the text.

Page S-4, para, 3, This paragraph describes the recent survey work done by our office in 1995 and 1997. As written, this paragraph gives the somewhat misleading impression that this recent work to relocate and assess the condition of sites found in 1982 and 1984 took place near areas where telescopes were being constructed. While it is true that none appear to have been disturbed directly by construction activities, almost all are at quite a distance from existing telescopes. Also we would not refer to the 1995 work as "a full reconnaissance survey." It was simply a survey to relocate and assess previously identified historic properties. It should also be mentioned that the sites being assessed are mostly shrines.

Response: We will make the necessary corrections. We wanted to make it clear that telescope construction on the summit has in no way disturbed previously-located archaeological sites. As you are aware, an archaeological clearance was given for each facility built on the mountain.

We will revise the statement in the EA to state "survey" rather than "full reconnaissance survey." We will also mention that the sites being assessed are mostly shrines although we did incorporate the 1983 SRCDP EIS into the EA by reference. The archaeological study in the EIS described each of the sites located. It also included an ethnographic study of the summit area.

Page S-4, para. 5. Some of the commitments made here to reduce the visual impacts of the observatories and associated infrastructure would be appropriate in the MOA. For example, constructing retaining wells to maintain the structure of the cinder cone and its slopes is a mitigation measure that would help maintain the integrity of this historic property. Constructing the retaining wells of natural-colored materials so that they blend with the existing terrain is another appropriate mitigation measure.

Response: Thank you. We will include the measures in the MOA.

Page S-7, Table S-1 and Page II-15, Table 2-1. In this summary table, Section 106 of the National Historic Preservation Act and the accompanying regulations should be listed under federal compliance and not the state or Board of Land and Natural Resources. The State Historic Preservation Office only plays a role in the Section 106 process, it does not implement the process. This law, like that of NEPA, is triggered in this case by the expenditure of federal funds on the project. Chapter 6E.8 is triggered by the project taking place on state land and the involvement of a state agency.

Response: It was included under the State because of the critical role the State Historic Preservation Officer (SHPO) plays in the Section 106 process. We will, however, make your suggested correction in the Final EA.

Pages II-11 and II-13 and Page IV-8. These discussions make numerous commitments that would be appropriate in the MOA. The commitment is made to prevent the accidental dispersal of debris from construction and storage sites (Page II-13, para. 9), but the discussion does not address who is responsible for collecting debris and materials that are dispersed despite the best of intentions. Contingency plans for clean-up should be included. Also, the discussion mentions monitoring by the Mauna Kea Support Services and that additional recommendations by the consulting entomologist will be in the construction contract. Additional recommendations may also result from consultations with the native Hawaiian community.

Response: UH IfA is now incorporating stringent conditions in its agreements with the observatories. These conditions must also be incorporated into the construction contracts. In other words, they must do it. We will accept suggestions from any group on how to better manage containment of construction debris.

Page III-9, paras, 3 and 4. This "Cultural Resources" section does not really depict the nature and distribution of known historic properties in the summit region or in these areas closest to the proposed project area. We suggest that this section be revised so that the results of the 1982 and 1984 surveys are better represented in the opening paragraph. It should be made clear that the 40 sites identified during those surveys are almost certainly religious shrines and that these surveys were limited geographically. While it is true that pre-construction surveys have not found historic

sites in the summit area, some were found during the survey conducted for the VLBA Antenna. The sentence that "No additional sites were located" is also misleading because the more recent surveys have identified a substantial number of addition shrines in the summit region. Although the reports of these surveys have not been completed, a draft report on site characteristics and distribution patterns was submitted to IFA in February 1999. At a minimum these greater numbers should be mentioned. As we mentioned in an earlier comment (Page S-4, para. 3), our field work in 1996 had other objectives and it is somewhat misleading to say these sites were not damaged by telescope construction when the historic sites are located a considerable distances from the observatories. We are also puzzled by the description of the geological attributes of the Mauna Kea Ice Age Reserve in the "Cultural Resources" section. The adze quarry is appropriate in this discussion but it should also be mentioned after the distribution of known shrines.

Response: As stated previously, the SRCDP FEIS was incorporated into this EA by reference (Page I-8). In the interest of brevity, we did not repeat all of the information that was presented in that document. The VLBA survey was not included because the area surveyed, 12,200-foot elevation, was not directly or indirectly affected by the proposed project. We will, nonetheless expand the section in the final EA and include statements selected from your letter. We will also mention the latest 1999 study. We wanted to make it clear that telescope construction on the summit has in no way disturbed previously-located archaeological sites. As you are aware, an archaeological clearance was given for each facility built on the mountain. We will work with you to present the adze quarry properly in the EA.

Page IV-1, para. 5 and Page IV-2, paras, 1 and 2. As discussed in our cover letter, this history of the project area should be clarified as it is not clear if the 71,700 square feet used for the Keck II Observatory has been substantially or only moderately altered.

Response: As stated previously, an extensive review was undertaken of the Keck I and Keck II grading plans compared to the topography of the Pu'u prior to any construction taking place. It is evident from these surveys that all of the area to be used for the construction of the Outrigger telescopes and associated infrastructure has been extensively graded, cut and altered from its original state.

Page IV-3, para, 5, The potential need to stabilize the cinder cone and its slopes should be addressed in the MOA as should a commitment to maintain the general shape and form of the cone in a manner that blends with the terrain.

Response: We will do so.

Page IV-3, paras. 7 and 8. The issue of drainage and erosion should be addressed in the MOA because the formation of gullies on the cone slopes would affect the integrity of the historic property. While the mitigation proposed may alleviate the problem, the MOA should probably include a provision for the long-term monitoring of their effectiveness in case unforeseen erosion occurs.

Response: We will do so.

Page IV-8 and IV-9, Historical and Cultural Resources. Our comments on this section are similar to those expressed earlier (Page S-4, para, 3; Page III-9, paras. 3 and 4). We feel the known distribution of shrines in the summit region should be given greater prominence than the adze quarry in this context. It should be explicitly stated that the forty known sites are most likely religious shrines. As we have argued in our cover letter, our assessment of historic properties in the project area and the potential effects of the project is substantially different from that which is stated here.

Response: As stated previously, we will expand the section with more information from previous referenced studies. We are aware that your assessment is different from what is stated in the EA. As you know, we were unable to obtain this information prior to filing the DEA and we depended on your office's past determinations for the project site.

Page IV-9 and IV-10, Aesthetics. A number of the identified issues in this section and proposed mitigation measures should be included in the MOA. This includes potential affects during the construction period and those that are long-range.

Response: Construction sites are inherently somewhat unsightly; however, every effort will be made to minimize the negative visual effects of construction activities. These and the previously-mentioned long-range mitigations will be incorporated into the MOA.

Thank you again for all of your assistance in insuring that all historic and cultural issues are addressed. We will be in contact with your office throughout the Section 106 consultation and review process.

Sincerely yours,

Robert A. McLaren
Interim Director

RAM:nll
cc: OEQC
CARA
MCM Planning

APPENDIX C

LIST OF HISTORIC PROPERTIES LOCATED IN THE HALE POHAKU AREA (SITE 50-10-23-16244)

LIST OF HISTORIC PROPERTIES LOCATED IN THE HALE POHAKU AREA (SITE 50-10-23-16244)**

State Site No.	BPBM Site No. 50-Ha-G28-87-	Description	Functional Interpretation
10310	Locality 1	Lithic scatter	Adze and octopus sinker manufacturing workshop
10311	Locality 2	Lithic scatter	Adze and octopus sinker manufacturing workshop
10312	Localities 3 and 4	Lithic scatter	adze and octopus sinker manufacturing workshop
10313	Shrine 1	3-5 uprights and octopus sinker manufacture offerings	Octopus sinker manufacturing ritual
10314	Locality 5	Lithic scatter	Adze and octopus sinker manufacturing workshop
10315	Shrine 2	1 upright	ritual
10316	Locality 6	Lithic scatter	Adze and octopus sinker manufacturing workshop
10317	Locality 7	Lithic scatter and firepit	Possible temporary camp and adze and octopus sinker manufacturing workshop
10318	Locality 9	Lithic scatter	Adze and octopus sinker manufacturing workshop
10319	Locality 10	Lithic scatter	Octopus sinker manufacturing workshop
10320	Locality 8	Lithic scatter and firepit	Temporary camp and adze and octopus sinker manufacturing workshop
10321	Locality 11	Lithic scatter	Adze and octopus sinker manufacturing workshop
10322	Locality 12	Lithic scatter	Octopus sinker manufacturing workshop
10323	Locality 4	Lithic scatter	Adze and sinker manufacturing workshop
16245	Locality 13	Lithic scatter	Adze and octopus sinker manufacturing workshop
16246	Locality 14	Lithic scatter	Adze and octopus sinker manufacturing workshop

**The State site numbers were arbitrarily assigned by Cordy (1994:Table 28) before the 1991 site report was submitted to SHPD. Cordy assigned numbers to each of the 14 remains identified in the survey and also gave a number (50-10-23-16244) to the whole site complex (BPBM Site No. 50-Ha-G28-87), which was called the Pu`u Kalepeamoa Site by McCoy (1985, 1991)

APPENDIX D

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
1997.02	*12,979*	*Stacked rocks*	*Historic shelter/PM2006.014*
1997.07	*13,308*	*Stacked (2) rocks on a boulder*	*Marker/2005.04*
1997.11	12,864	Stacked (2) rocks on an outcrop	Unknown
1997.12	13,028	Leaning stone	Unknown
1997.13	13,124	Stone slabs on outcrop	Unknown
1997.15	12,994	Stacked (2) rocks on outcrop	Marker
1997.17	*12,506*	*Stacked (4) rock on boulder*	*Marker/RN2006.006*
1997.18	*12,457*	*Single rock on boulder*	*Marker/RN2006.068*
1997.19	12,342	Stacked (9) rocks on a boulder	Marker
1997.20	13,054	Filled areas (2) on outcrop	Unknown
1997.21	13,091	Overhang with stacked rock wall	Temporary shelter
2005.01	13,803	C-shape at Site 21209	Temporary shelter
2005.02	12,950	Stacked rocks	Marker
2005.03	13,271	Stacked (3) rocks	Marker
2005.04	*13,220*	*Stacked rocks*	*Marker/1997.07*
2005.05	13,220	Stacked rocks	Marker
2005.06	13,202	Possible upright	Unknown
2005.07	13,000	Possible uprights	Unknown
2005.08	13,140	Two uprights near weather station	Unknown
2005.09	13,016	Stacked rocks	Marker
2005.10	13,250	Air Force drone	Surveillance plane?
2005.11	12,770	Stacked (3) rocks on ridge toe	Marker
2005.12	13,340	Stacked boulders on whaleback ridge	Marker
2005.13	13,000	Stacked (4) rocks on a boulder	Marker
2005.14	13,000	Stacked (4) rocks on a boulder	Marker
2005.15	13,000	Stacked (2) rocks	Marker
2005.16	13,245	Stacked (3) rocks	Marker
2005.17	13,122	Stacked (8) rocks on a boulder/piled rock against a boulder, over shallow overhang	Marker
2005.18	13,093	Piled rock	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
2005.19	12,647	Stacked (4) rocks on a boulder and 2 rocks on an outcrop	Marker
2005.20	12,378	Stacked (2) rocks on a boulder	Marker
2005.21	13,000	Stacked rocks	Marker
2005.22	12,950	Stacked rocks	Marker
2005.23	12,850	Stacked rocks	Marker
2005.24	12,820	Stacked rocks	Marker
2005.25	12,790	Stacked (4) rocks on a boulder	Marker
2005.26	12,000*	Stacked (2) rocks on a boulder	Marker
2005.27	12,000*	Stacked linear mound	Unknown
2005.28	12,000*	Stacked rocks	Marker
2005.29	12,000*	Stacked rocks	Marker
2005.30	12,000*	Stacked rocks on a boulder	Marker
2005.31	12,841	Stacked (5) rocks with orange spray paint on one	Marker
2005.32	12,800	Single upright abutting a boulder	Unknown
2005.33	12,000*	Single upright	Unknown
2005.34	12,943	Stacked (3) rocks	Marker
2005.35	12,632	Stacked (5) rocks on a boulder	Marker
2005.36	12,654	Rock placed upright on a boulder	Marker
PM2006.01	13,159	Two (2) stacked rock on boulder	Marker
PM2006.02	13,057	Single upright leaning on boulder	Modern shrine?
PM2006.03	12,919	Single rock on boulder	Marker
PM2006.04	12,826	Support rocks and wood	Surveyor's marker
PM2006.05	12,817	Two (2) rocks	Marker
PM2006.06	11,894	Six (6) rocks next to boulder	Unknown
PM2006.07	11,893	Three (3) rocks on boulder	Marker
PM2006.08	12,627	Four (4) rocks	Marker
PM2006.09	12,040	Upright on soil	Unknown
PM2006.10	11,976	Seven (7) piled rocks on boulder	Marker
PM2006.11	11,997	Two (2) rocks on boulder	Marker
PM2006.12	12,251	Single rock on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2006.13	12,255	Three (3) rocks on boulder	Marker
PM2006.14	*12,233*	*Single rock on boulder*	*Marker/1997.02*
PM2006.15	12,211	Single rock on boulder	Marker?
PM2006.16	12,036	Single rock on boulder	Marker?
PM2006.17	12,047	Single rock on boulder	Marker?
PM2006.18	12,002	Single rock on boulder	Marker?
PM2006.19	12,010	Single rock on boulder	Marker??
PM2006.20	11,970	Single rock on boulder	Marker?
PM2006.21	11,885	Seven (7) rocks on two boulders	Marker
PM2006.22	11,905	Two (2) rocks on boulder	Marker
PM2006.23	11,895	Six (6) rocks on boulder	Marker
PM2006.24	11,885	Two (2) rocks on boulder	Marker
PM2006.25	11,905	Single rock on each boulder(2)	Marker?
PM2006.26	11,895	Single rock on boulder	Marker?
PM2006.27	11,885	Single rock on boulder	Marker?
PM2006.28	11,905	Four (4) rocks on boulder	Marker
PM2006.29	11,895	Cluster of Find Spots	Marker?
PM2006.30	11,885	Cluster of Find Spots on a ridge below Pu'u Lilinoe	Marker?
PM2006.31	12,234	Single Rock on boulder adjacent to Site 25769 (lithic scatter)	Modern site marker?
PM2006.32	12,522	Single rock on boulder	Marker?
PM2006.33	12,203	Single rock on boulder	Marker?
PM2006.34	12,107	Stacked rock on boulder	Marker/Cairn
PM2006.35	12,215	Three (3) rocks on boulder	Marker
PM2006.36	12,057	Four (4) rocks on boulder	Marker
PM2006.37	12,084	Single rock on boulder	Marker
PM2006.38	12,149	Three (3) rocks on boulder	Marker
PM2006.39	*12,108*	*Two (2) rocks on boulder*	*Marker/RN2006.024*
PM2006.40	12,147	Three (3) rocks on boulder	Marker
PM2006.41	12,904	Two (2) rocks on boulder	Marker
PM2006.42	12,054	Seven (7) rocks on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2006.43	12,877	Four (4) rocks on boulder	Marker
PM2006.44	12,881	Nine (9) rocks on boulder	Marker
PM2006.45	12,346	Four (4) rocks on boulder	Marker
PM2006.46	12,339	Two (2) rocks on boulder with roses, ti leaf, a crystal, and a heart-shaped piece of coral	Modern shrine
PM2006.47	12,988	Three (3) rocks on boulder	Marker
PM2006.48	12,795	Six (6) rocks, two (2) stacked on boulder	Marker
PM2006.49	12,964	Single upright, no support stones	Unknown
PM2006.50	12,234	Single rock on boulder with three (3) stacked rocks next to boulder	Unknown
PM2006.51	12,522	Vertically oriented stone on boulder	Modern shrine
PM2006.52	12,203	Cluster of four (4) find spots, including one (1) with a rounded stone boulder	Markers?
PM2006.53	12,107	Two (2) stacked rocks on boulder	Marker
PM2006.54	12,215	Single rock on boulder	Marker
PM2006.55	12,057	Single Rock on boulder	Marker
PM2006.56	12,084	Two (2) rocks on boulder	Marker
PM2006.57	12,149	Two (2) stacked rocks on boulder	Marker
PM2006.58	12,108	Two (2) stacked rocks and three to four (3-4) piled rocks on outcrop	Marker?
PM2006.59	12,147	Seven (7) stacked rocks on ridgetop	Marker
PM2006.60	12,904	Two (2) boulders, one with two (2) stones on top, the second with seven (7) stones	Marker
PM2006.61	12,054	Four (4) stacked rocks on ridgetop	Marker?
PM2006.62	12,877	Two (2) stacked rocks on boulder	Marker
PM2006.63	12,881	Two (2) rocks on boulder	Marker
PM2006.64	12,346	Ten (10) piled rocks on glacial outwash plain ca. 5 m north of Site 25766	Modern site marker?
PM2006.65	12,339	Three (3) mounds of piled rocks, 2-3 meter area	Markers
PM2006.66	12,505	name “Adam” spelled out with rocks on summit of cinder cone	Memorial marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2006.67	12,423	Two (2) adjacent boulders with two (2) piled rocks on one and four (4) on the other	Marker
PM2006.68	12,425	Two (2) adjacent boulders with two (2) rocks on one and four (4) on the other	Marker
PM2006.69	12,390	Six (6) piled rocks on boulder	Marker
PM2006.70	12,304	Five (5) piled stones on boulder	Marker
RN2006.01	12,505	Single rock on boulder	Marker?
RN2006.02	12,423	Wood and metal	Surveyors marker
RN2006.03	12,425	Rock alignment	Hunters blind?
RN2006.04	12,390	Rock alignment	Hunter blind?
RN2006.05	12,304	Single rock on boulder	Marker
RN2006.06	*12,505*	*Four (4) stacked rock on small boulder*	*Marker/1997.017*
RN2006.07	12,423	Seven (7) piled rock on boulder	Marker
RN2006.08	12,425	Three (3) features: 1= single rock on boulder 2 = Three (3) rock on boulder one is upright with the other two on top 3= four (4) rock on boulder	Recent shrine or marker
RN2006.09	12,390	Three (3) rocks next to boulder (rock are light grey in color)	Unknown
RN2006.10	**12,304**	**Fifteen plus (15+) slabs and rock on boulder; one aluminum can present**	**Disturbed shrine? Now reported as Site 25792**
RN2006.11	12,505	Two (2) rock on boulder	Marker
RN2006.12	12,423	Two rock on boulder	Marker
RN2006.13	12,425	Single rock on boulder	Marker
RN2006.14	12,390	Three (3) rocks on boulder	Marker
RN2006.15	12,304	Two (2) rocks on boulder	Marker
RN2006.16	12,505	Eleven (11) rocks on boulder	Marker?
RN2006.17	12,423	Three (3) mounds with wood and metal	Surveyors markers
RN2006.18	12,425	Single rock on boulder	Marker
RN2006.19	12,390	Single rock on boulder	Marker?
RN2006.20	12,304	Two (2) rocks on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.21	11,948	Three (3) rocks on boulder; two additional spots N and NE	Marker
RN2006.22	11,924	Four (4) features: 1= 13 rocks on boulder [6 are slabs] 2= single rock on boulder 3 = four rocks on boulder and 4 = 11 rocks on boulder [7 are light grey in color]	Unknown
RN2006.23	11,933	Single rock on boulder	Marker
RN2006.24	12,099	Two (2) stacked rocks on boulder	Marker
RN2006.25	12,138	Two (2) stacked rocks on boulder (another spot west ~25 m)	Marker
RN2006.26	12,133	Thirty plus (30+) rocks on boulder	Marker
RN2006.27	12,148	Six plus (6+) single cobble on boulder spots in this area	Unknown
RN2006.28	12,204	Single rock on boulder (another spot downslope [SE])	Marker
RN2006.29	12,225	One (1) cobble on boulder	Marker
RN2006.30	12,225	Three (3) rocks on boulder	Marker?
RN2006.31	12,190	Single rock on boulder	Marker?
RN2006.32	12,033	Single rock on boulder	Marker?
RN2006.33	12,033	Thirteen plus (13+) pebbles and cobbles and boulder	Unknown
RN2006.34	12,003	Two rocks on outcrop	Unknown
RN2006.35	11,949	Two (2) stacked rock on boulder	Marker
RN2006.36	11,916	Three (3) rocks on boulder; two (2) are stacked	Marker
RN2006.37	11,868	Single rock on boulder	Marker
RN2006.38	11,889	Single rock on boulder	Marker
RN2006.39	11,898	Four features: three are single rocks on boulder and one has 25 pebbles and cobbles on a boulder	Modern marker?
RN2006.40	11,881	Three (3) rocks and a slab on boulder: another spot is E/NE (15 m) and is a single rock on boulder	Marker, possibly a shrine
RN2006.41	11,976	Two (2) rocks on boulder; Adze blank found here. Another spot is 30 m downslope and looked like a single on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.42	11,987	Single rock on boulder	Marker
RN2006.43	11,994	Two (2) stacked rocks on boulder	Marker
RN2006.44	12,003	Single rock on boulder	Marker
RN2006.45	12,001	Two (2) rocks on boulder; two additional spots S and N. Each has 2-3 rocks on a boulder	Marker
RN2006.46	12,080	Single light grey slab on boulder	Unknown
RN2006.47	12,103	Single rock on outcrop	Unknown
RN2006.48	12,222	Two (2) stacked cobbles on gelifluction terrace	Unknown
RN2006.49	12,125	Single rock on boulder and four (4) rocks on second boulder	Markers
RN2006.50	12,131	Single rock on boulder	Marker?
RN2006.51	12,261	Single rock on boulder	Marker?
RN2006.52	12,539	Several single rocks on whaleback ridge	Markers?
RN2006.53	12,492	Two (2) rocks on outcrop	Unknown
RN2006.54	12,427	Two (2) stacked rocks on boulder	Marker
RN2006.55	12,418	Two (2) stacked rocks on boulder	Marker
RN2006.56	12,214	Two single rocks on boulders with rusted cans (sardine and pork and beans – key openers for the bean cans. Stick wedged between boulder and rocks	Historic markers?
RN2006.57	12,165	Six (6) pebbles and cobbles on small boulder	Unknown
RN2006.58	12,210	Two (2) stacked small boulders	Unknown
RN2006.59	12,295	Two (2) stacked rocks on boulder	Marker
RN2006.60	12,239	Single rock on boulder	Marker?
RN2006.61	12,241	Single rock on boulder	Marker?
RN2006.62	----	Single rock on boulder and 2-3 rocks on second boulder	Unknown/No GPS data
RN2006.63	13,291	Two (2) stacked rocks on boulder	Marker
RN2006.64	12,964	Nine (9) rocks on boulder, second boulder has three (3) rocks	Markers?
RN2006.65	12,896	Two (2) stacked rocks on boulder	Marker
RN2006.66	12,785	Single (large) tabular slab broken into three pieces	Unknown

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.67	12,774	Single rock on small boulder	Unknown
RN2006.68	*12,476*	*Single rock on boulder*	*Unknown/1997.018*
RN2006.69	12,391	Multiple find spots – rocks on boulders	Markers
RN2006.70	12,386	Eleven (11) rocks on boulder, three additional find spots with 1-2 rocks on boulders nearby	Markers
RN2006.71	12,854	Eight (8) rocks on red-colored boulder	Marker
RN2006.72	12,779	Ten (10) piled rocks on outcrop	Marker
RN2006.73	12,799	Six (6) rocks (three cobbles and three pebbles) on boulder	Unknown
RN2006.74	12,897	Two (2) stacked rocks on outcrop	Unknown
RN2006.75	12,703	Two (2) stacked rocks on small boulder	Unknown
RN2006.76	11,860	Piled rock on boulder	Marker
RN2006.77	11,914	One (1) rock on boulder	Marker
RN2006.78	11,928	Piled rock on boulder	Marker
RN2006.79	11,595	Piled rock on boulder	Marker
RN2006.80	12,239	Two (2) rocks on boulder	Marker
RN2006.81	12,094	Stacked rock on boulder	Marker
RN2006.82	11,935	Two (2) rocks on boulder	Marker
RN2006.83	11,894	Piled rock on boulder	Recent marker?
RN2006.84	12,323	Seven (7) FS recent construction	Recent practitioners
RN2006.85	**12,335**	**Adze preform**	**Isolate artifact/changed to Site 25767**
RN2006.86	12,358	Piled rock on boulder	Marker
RN2006.87	13,012	Two (2) rocks on boulder	Marker
RN2006.88	13,053	1 (1) rock on boulder	Marker
RN2006.89	12,479	Cairn, stake, pins, stakes, and wire	Survey marker
RN2006.90	12,442	U-shaped enclosure w/ rusted cans	Historic temporary shelter
RN2006.91	12,457	Boulder with four (4) cobbles on top with a wooden pole placed against the boulder	Marker
RN2006.92	12,341	Boulder with four (4) cobbles on top	Marker
RN2006.93	12,479	Wall with cleared area east of wall	Temporary shelter
RN2006.94	12,768	Cairn with pole in center	Marker
RN2006.95	12,767	Cairn with pole in center	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.96	12,442	Boulder with scattered cobbles	Marker
RN2006.97	12,702	Mound	Unknown
RN2006.98	12,478	Four (4) cobbles holding down a piece of aluminum	Marker
RN2006.99	11,791	Piled rock on boulder	Marker
RN2006.100	12,196	Boulder with two (2) cobbles stacked on top	Marker
RN2006.101	12,065	Boulder with five (5) cobbles on top and a possible fallen upright at the base of the boulder	Marker
RN2006.102	12,327	Boulder with two (2) cobbles stacked on top	Marker
RN2006.103	12,331	Boulder with 13 cobbles on top	Marker
RN2006.104	12,418	Enclosure	Temporary shelter
RN2006.105	12,475	Two (2) rocks on boulder	Marker
RN2006.106	12,135	Two (2) FS: 1) is a boulder with five (5) cobbles on top 2) a split boulder with seven (7) cobbles piled in crack	Markers
RN2006.107	12,058	Enclosure – outside boundary	Temporary shelter
RN2006.108	12,222	Boulder with five (5) cobbles on top	Marker
RN2006.109	12,925	Rock pile with two (2) sticks	Marker
RN2006.110	12,583	Small boulder with four (4) stacked cobbles on top	Marker
RN2006.111	12,507	Boulder with seven (7) cobbles on top	Marker
RN2006.112	12,448	Boulder with two (2) cobbles on top	Marker
RN2006.113	11,870	Boulder with two (2) cobbles on top	Marker
RN2006.114	12,088	Rock pile with lava bomb on top	Marker
RN2006.115	12,081	Mound	Unknown
RN2006.116	12,085	Mound with two (2) sticks	Unknown
RN2006.117	12,113	Rock pile	Unknown
RN2006.118	12,416	Boulder with two (2) cobbles on top	Marker
RN2006.119	11,879	Two rock mounds	Unknown
RN2006.120	12,029	Mound with cobbles on top	Marker
RN2006.121	11,853	Boulder with three (3) cobbles on top. Possible flake on north side of boulder	Marker
RN2006.122	12,099	Boulder with two (2) cobbles on top	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2006.123	13,130	Cairn with slab on end on top	Recent marker
RN2006.124	**12,546**	**Eight (8) cobbles stacked on boulder**	**Marker/Site 21434**
RN2006.125	12,058	Enclosure	Temporary shelter
PM2007.01	12,535	Upright-like cobble supported by two cobbles	Marker
PM2007.02	12,197	Two cobbles on low angular boulder	Marker
PM2007.03	11,984	Two cobbles on small boulder	Marker
PM2007.04	11,859	Two large cobbles and three medium cobbles on flat, low boulder	Marker
PM2007.05	12,129	Two flat cobbles and one angular cobble on boulder	Marker
PM2007.06	12,118	Two large cobbles on flat boulder	Marker
PM2007.07	12,153	Five medium cobbles on medium boulder	Marker
PM2007.08	12,125	Four cobbles/small boulders on large boulders	Marker
PM2007.09	12,069	Four cobbles and a few pebbles on large boulder	Marker
PM2007.10	12,051	Two large cobbles on outcropping	Marker
PM2007.11	12,707	Three cobbles on boulder	Marker
PM2007.12	13,036	Two sets of stacked cobbles on outcropping	Marker
PM2007.13	13,056	Three cobbles on small boulders	Marker
PM2007.14	13,035	Eight to ten cobbles stacked on boulder	Marker
PM2007.15	12,889	Six cobbles stacked on outcropping	Marker
PM2007.16	12,804	Seventeen cobbles piled on outcropping	Marker
PM2007.17	12,521	Two find spots: cobbles on boulders	Marker
PM2007.18	13,017	Two large cobbles stacked on boulder	Marker
PM2007.19	13,619	Five cobbles on boulder	Marker
PM2007.20	13,577	Seven cobbles piled on outcropping	Marker
PM2007.21	12,823	Five cobbles stacked on boulder	Marker
PM2007.22	12,800	Three cobbles stacked on outcropping	Marker
PM2007.23	12,729	Four cobbles stacked on outcropping	Marker
PM2007.24	12,599	Three cobbles stacked on boulder	Marker
PM2007.25	11,696	Three cobbles stacked on outcropping	Marker
PM2007.26	12,564	Three cobbles stacked on outcropping	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
PM2007.27	11,875	Three cobbles on boulder	Marker
PM2007.28	12,069	Two cobbles stacked on boulder	Marker
PM2007.29	12,059	Two find spots: cobbles stacked on two boulders	Marker
PM2007.30	12,047	Three cobbles stacked on boulder	Marker
PM2007.31	12,006	Three cobbles stacked on boulder	Marker
PM2007.32	12,085	Seven cobbles on boulder	Marker
PM2007.33	12,398	Two cobbles on boulder	Marker
PM2007.34	12,381	Fifteen cobbles piled on boulder	Marker
PM2007.35	12,707	Two cobbles piled on outcropping	Marker
PM2007.36	12,614	Six cobbles piled on boulder	Marker
PM2007.37	12,918	Four cobbles stacked on boulder	Marker
RN2007.01	12,968	Cobbles scattered on boulder	Marker
RN2007.02	12,091	Four cobbles, one small boulder, and one slab on boulder	Marker
RN2007.03	12,942	Two cobbles stacked on flat slab	Marker
RN2007.04	11,933	Wall-like structure	Temporary shelter
RN2007.05	11,960	Four cobbles piled on boulder	Marker
RN2007.06	12,140	Six cobbles piled on boulder	Marker
RN2007.07	12,129	Two cobbles on boulder	Marker
RN2007.08	12,123	Two cobbles stacked on boulder	Marker
RN2007.09	12,034	Camping gear: tent, sleeping mat, sleeping bag, and one plastic bottle	Temporary camp site
RN2007.10	12,290	Two cobbles piled on boulder	Marker
RN2007.11	12,450	Two cobbles on boulder with a tabular slab on the ground	Marker
RN2007.12	12,434	Seventeen cobbles piled on boulder	Marker
RN2007.13	12,686	Single cobble on boulder visible from a distance	Marker
RN2007.14	12,778	Eight cobbles piled on boulder	Marker
RN2007.15	11,905	90-100 cobbles piled	Marker
RN2007.16	12,001	Two cobbles piled on boulder	Marker
RN2007.17	12,041	Three cobbles stacked on boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2007.18	12,149	Two cobbles piled small boulder	Marker
RN2007.19	11,982	Two cobbles on large boulder	Marker
RN2007.20	12,244	Five cobbles piled on large boulder	Marker
RN2007.21	12,214	Fifteen cobbles piled on medium boulder	Marker
RN2007.22	12,169	Seven cobbles stacked on large boulder. A 2nd FS nearby	Marker
RN2007.23	12,138	Eight cobbles piled on small boulder	Marker
RN2007.24	12,239	Seven cobbles piled on outcropping	Marker
RN2007.25	12,358	Five cobbles stacked on outcropping	Marker
RN2007.26	12,451	Four cobbles piled on large boulder	Marker
RN2007.27	12,432	Eleven cobbles piled on large boulder	Marker
RN2007.28	12,679	Two cobbles on outcropping	Marker
RN2007.29	12,662	Five slabs stacked on low flat boulder	Marker
RN2007.30	13,207	Eleven cobbles piled on outcropping	Marker
RN2007.31	12,964	Two cobbles stacked on outcropping	Marker
RN2007.32	13,698	Thirty+ cobbles and small boulders piled on cinder (recent offering present)	Marker
RN2007.33	13,667	Alignment of cobbles forming an enclosure	Temporary shelter
RN2007.34	12,923	Two cobbles stacked on small boulder	Marker
RN2007.35	12,871	Two cobbles stacked on small boulder	Marker
RN2007.36	12,776	Three flat slabs stacked on outcropping	Marker
RN2007.37	12,760	Six cobbles dispersed on outcropping	Marker
RN2007.38	12,686	Three cobbles piled on medium boulder	Marker
RN2007.39	12,662	Two find spots: stacked cobbles on outcropping	Marker
RN2007.40	12,799	Five slabs stacked on outcropping	Marker
RN2007.41	12,711	Six cobbles piled on small boulder	Marker
RN2007.42	12,536	Two cobbles stacked on small boulder	Marker
RN2007.43	12,055	Three cobbles piled on large boulder. Two other FS nearby. One pair of Army issued boots observed	Marker
RN2007.44	12,056	Eight cobbles stacked on small boulder	Marker
RN2007.45	11,976	Three cobbles piled on large boulder	Marker

FIND SPOTS RECORDED IN THE SCIENCE RESERVE

Year. No.	Approximate Elevation (ft. asl)	Description	Function
RN2007.46	12,493	Seven cobbles stacked on large boulder. A stick is placed in the center	Marker
RN2007.47	12,368	Two find spots: cobbles stacked on boulders	Marker
RN2007.48	12,349	Thirty six cobbles stacked on large boulder. A towel is placed on south side with 12 cobbles holding the towel in place	Marker
RN2007.49	12,331	Three cobbles piled on boulder	Marker
RN2007.50	12,451	Three cobbles stacked on boulder	Marker
RN2007.51	12,422	Three cobbles stacked on boulder	Marker
RN2007.52	12,486	Four cobbles piled on boulder	Marker
RN2007.53	12,472	Five cobbles stacked on boulder	Marker
RN2007.54	12,657	Two cobbles on boulder	Marker
RN2007.55	12,705	Eight cobbled piled on outcropping. Rusted can nearby	Marker
RN2007.56	12,497	Four cobbles stacked on small boulder	Marker
RN2007.57	11,801	Five cobbles piled on large boulder	Marker
RN2007.58	11,794	Three cobbles piled on medium boulder	Marker
RN2007.59	11,697	Three cobbles piled on boulder	Marker
RN2007.60	11,701	Three cobbles piled on boulder	Marker
RN2007.61	11,699	Four cobbles on boulder	Marker
RN2007.62	11,683	Two cobbles stacked on large boulder	Marker
RN2007.63	11,738	Four cobbles piled on large boulder	Marker
RN2007.64	11,711	Seven cobbles piled on boulder	Marker
RN2007.65	11,739	Two find spots: cobbles piled on two large boulder	Marker

Italicized — *Find Spot recorded and has multiple identification numbers*
Bold — **FS changed to Site**
* — Estimated elevation

APPENDIX E

SAMPLE CONSULTATION LETTER ON OBSERVATORY MAINTENANCE ACTIVITIES

SAMPLE CONSULTATION LETTER ON OBSERVATORY MAINTENANCE ACTIVITIES

Dr. Robert A. McLaren
Associate Director
Institute for Astronomy
University of Hawaii
2680 Woodlawn Drive
Honolulu, HI 96822

Dear Dr. McLaren,

Pacific Consulting Services, Inc. (PCSI), a Honolulu-based consulting firm, is currently under contract to the Office of Mauna Kea Management (OMKM) to complete an archaeological inventory survey of the Mauna Kea Science Reserve and to develop several components of an historic preservation management plan for the Science Reserve. The following documents are being prepared for submittal to the State Historic Preservation Division for the purpose of demonstrating that the University of Hawai'i is complying with Chapter 6E (Hawaii Revised Statutes) and Section 106 of the National Historic Preservation Act:

1. List of maintenance activities and routine operations carried out by IfA and/or OMKM that may be excluded from the Historic Preservation Review and Compliance Process
2. Map and description of previously altered areas within the Area of Potential Effect (APE)
3. List of maintenance activities needing prior review, and potential compliance measures, and
4. An emergency plan that describes how OMKM/IfA will avoid or minimize damage to historic properties during emergency situations.

We need your assistance in preparing some of these documents.

The Area of Potential Effect (APE), a term used in cultural resource management studies, is commonly defined as the geographic area or areas within which an action may affect historic properties, if any such properties are present or thought to exist. The APE does not equate to the "footprint" of a building or road, for example, and must therefore take into consideration a larger geographic area. The definition of the APE is not limited to the consideration of physical effects alone, but should also take into consideration the potential for visual and auditory effects and indirect impacts, such as erosion, especially in the case of culturally and spiritually significant places like Mauna Kea. The APE for the maintenance activities and routine operations carried out by IfA and/or OMKM includes the 11,288 acre Mauna Kea Science Reserve (TMK: (3) 4-4-15:09) and a 19.3 acre parcel (TMK: (3) 4-4-15:12) at Hale Pohaku, which is the site of the mid-level facilities that include the Onizuka Center for International Astronomy, dormitories, maintenance buildings, and construction worker cabins.

The Mauna Kea Science Reserve contains a large number of historic properties, including the overlapping series of cinder cones that form the summit (Kūkahau'ula), which is a recognized Traditional Cultural Property (historic properties that are eligible for inclusion in the National Register of Historic Places because of their association with cultural practices or beliefs of a living community). Historical information indicates that Kūkahau'ula referred to both a legendary figure and to a character in traditional histories and genealogies. The Mauna Kea Science Reserve is also included in the Mauna Kea Summit Region Historic District, which was determined eligible for both the State and National Register of Historic Places in 1999.

A site called the Pu'u Kalepeamoa, after the name of the prominent cinder cone, was discovered at Hale Pohaku in 1984. A series of archaeological investigations have been conducted at this site, only a portion of which is located within UH lease area. The most recent work at Hale Pohaku, conducted in March 2005, involved archaeological monitoring of four septic tank excavations. The monitoring report noted that while all of the known surface features in the lease area have undergone data recovery and no longer exist, there is the possibility that buried cultural deposits might exist in some undisturbed areas.

The road between Hale Pohaku and the summit, which is currently maintained by Mauna Kea Observatories Support Services (MKOSS), is included in the APE because, except for specific areas that are under the responsibility of the Natural Areas Reserve System (NARS), the roadway and a 400-yard corridor on either side of it are the responsibility of the UH. Although a reconnaissance survey of a 100-ft wide corridor on both sides by the Bishop Museum in 1987 yielded negative results and subsequent archaeological investigations of selected areas near the road above the 12,000 ft elevation have not yielded evidence of sites either, a significant portion of the roadway easement has not yet undergone a systematic archaeological survey. The actual roadway between Hale Pohaku and the summit, and the previously surveyed 100-foot corridors on either side will be included on the map of previously altered areas, which means that these portions of the roadway easement can be listed among the excluded areas not requiring historic preservation review and compliance.

While most maintenance activities and routine operations related to the support of astronomical research on Mauna Kea are conducted or overseen by OMKM and/or MKOSS, there may be activities undertaken by some observatories that could potentially have an adverse effect on historic properties in the Science Reserve. The consultation process has thus been expanded to include each of the existing observatories, which is why we are asking for your assistance in providing information to help determine which activities should be included in the list of activities requiring historic preservation review and compliance and which activities can be excluded.

We are currently in the process of reviewing the Environmental Impact Statement (EIS) for the Keck Outrigger project and will be contacting you for clarification or any new or additional information pertaining to the following activities:

1. maintenance activities or routine operations involving the use of chemicals and other hazardous wastes in terms of how often they are delivered, how they are handled, how and where they are disposed of, and plans to mitigate accidental spills.

2. maintenance of the exterior dome surfaces and associated out-buildings (e.g., sheds), if they exist, in terms of, for example, how often they are painted and what kinds of repairs are made. The installation of safety ladders, small weather vanes and various other small instruments, such as cameras and anemometers, on a dome would be classified as "excluded activities."
3. maintenance activities that involve ground disturbance, such as the repair of underground utility lines, in terms of the equipment that is used, the extent of the area that is opened up, and how the excavations are filled.

We would like to contact you or a designated member of your staff by phone to discuss each of the above activities. Our plan is to begin this phone consultation process beginning June 5, 2006. If you should have any questions in the interim please contact Dr. Patrick C. McCoy in Honolulu at (808) 546-5557 Ext. 212 or via email at pat.mccoy@pcsihawaii.com

Sincerely,

Patrick C. McCoy
Senior Archaeologist
Pacific Consulting Services, Inc.

APPENDIX F

LIST OF GROUPS, AGENCIES AND INDIVIDUALS CONSULTED

LIST OF GROUPS, AGENCIES, AND INDIVIDUALS CONSULTED

	NAME	AFFILIATION
1	Ed Stevens	Kahu Ku Mauna Council member
2	Arthur Hoke	Kahu Ku Mauna Council member
3	Larry Kimura	Kahu Ku Mauna Council member
4	Leilehua Omphroy	Kahu Ku Mauna Council member
5	Toni Mallow	Kahu Ku Mauna Council member
6	Tiffnie Kakalia	Kahu Ku Mauna Council member
7	Sean Naleimaile	Kahu Ku Mauna Council member
8	Sharon Medeiros	Cultural practitioner
9	Maile (Spencer) Napoleon	Waimea resident
10	Anne Dressel	Guest
11	Betty and Fred Lau	Waimea Hawaiian Homes Board and Waimea Hawaiian Civic Club (HCC)
12	Ku “Clarence” Ching	Farmer
13	Kanani Kapuniai	Waimea Hawaiian Homesteaders Assn. Inc.
14	Reynolds N. Kamakawiwo`olea	Former Kahu Ku Mauna Council member
15	George K. Kahananui, Sr.	Community resident; no affiliation noted
16	Annie K. Coelho	Community resident; no affiliation noted
17	Aaron Kahananui	Community resident; no affiliation noted
18	Robert Boenig	Guest
19	Charles Young	Chair, Hawai`i Island Burial Council (HIBC)
20	Kaleo Kualii	HIBC member
21	Kimo Lee	HIBC member
22	Roy Helbush	HIBC member
23	Leningrad Elarionoff	HIBC member
24	Ronald Dela Cruz	HIBC member
25	Cynthia Nazara	HIBC member
26	Monica Bacon	Office of Hawaiian Affairs, Native Hawaiian Historic Preservation Committee (OHA, NHHPC)
27	Dr. Charles Burrows	OHA, NHHPC
28	Leslie Burrows	OHA, NHHPC
29	Jeno Enocencio	OHA, NHHPC
30	Ke`eaumoku Kapu	OHA, NHHPC
31	Christopher Kauwe	OHA, NHHPC
32	Kamika Kepaa	OHA, NHHPC
33	Kealakahi Meyers	OHA, NHHPC
34	Benjamin Noeau	OHA, NHHPC
35	Ke`ala Soares	OHA, NHHPC

LIST OF GROUPS, AGENCIES, AND INDIVIDUALS CONSULTED

	NAME	AFFILIATION
36	Noelani Watanabe	OHA, NHHPC
37	Apolei Bargamento	OHA, NHHPC
38	Sweet Mathews	OHA, NHHPC
39	Keola Lindsay	OHA, NHHPC
40	Ruby McDonald	Kona HCC; President [Chair] Assn. of HCCs, Hawai`i Island)
41	Sam Moniz	President, Waimea HCC
42	Lucille V. Chung	Laupahoehoe HCC
43	Nani Langridge	Prince David Kawananakoa HCC
44	Shirley Kanehailua	Laupahoehoe HCC
45	Les Goveia	Ka`u HCC
46	Anna Cariaga	Ka`u HCC
47	Raylene Moses	No affiliation noted
48	Christine Naito	President, Prince David Kawananakoa HCC
49	Andy Wynn	President, South Kohala HCC
50	Kaena Peterson	Vice President, South Kohala HCC
51	Lily K. Pa	Hilo HCC
52	Paulette Ke	Hilo HCC
53	Martha McNicoll	Hilo HCC
54	Mabel Tolentino	Waimea HCC
55	Moana DeLeon	No affiliation noted
56	Aileen Hussey	Community resident
57	Kris Hoke	Hilo HCC
58	Jerry Konanui	Hilo HCC; cultural practitioner
59	Sibi Hoke	Hilo HCC
60	Martha McNicoll	Hilo HCC
61	Paul Neves	Royal Order of Kamehameha